CLOSO

USER'S MANUAL

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1 INTRODUCTION

Accreditation of academic programs requires a continuous improvement procedure to attain a certain level of satisfaction of the program objectives. For this purpose, processes have to be designed and implemented to ensure proper assessment and evaluation of the learning outcomes. Demonstration of continuous quality improvement (CQI) processes is a major requirement of almost all the organizations accrediting programs at universities. Examples are Accreditation Board for Engineering & Technology (ABET) and the Associate to Advance Collegiate Schools of Business (AACSB), etc. At the core of a CQI plan is the assessments done through various courses. The basic components of an effective assessment plan include a program mission, a set of program educational objectives (PEOs), a set of student outcomes (SOs) and a curriculum with a set of prescribed course learning outcomes (CLOs) with a CLO-SO map for each course. All of these components are to be assessed, evaluated and periodically modified to implement a sustainable continuous improvement process. An effective assessment plan is a combination of both indirect and direct assessments. Direct assessment is the most reliable and important method of assessment. It is done through assignments, projects, in-class tests, oral presentations etc. Indirect methods supplement the direct assessments. They include student and faculty surveys, exit interviews, employers' surveys etc. In an assessment plan, the data collected from direct assessments in various courses need to be analyzed and evaluated. This evaluation process is time consuming and burdensome. Consequently, the university departments need a reliable system that would automate the whole process and save instructors' time.

CLOSO (Course Learning Outcomes - Student Outcomes)[1] represents a highly sustainable assessment and evaluation system for universities

[1] CLO and SO are the terminologies adopted in this manual and set in the software by default. However, the software allows the administrator to customize these terminologies and use the ones prevalent at the institution.

for improving learning outcomes of students. This software automates the evaluation of CLO and SO satisfaction and produces complete course-files for instructors. This automation results in drastic saving of instructor's time, error-free evaluation and high quality reports. CLOSO represents a highly reliable and sustainable system for producing data for academic accreditation.

1.1 Motivation

No general purpose software package is available to facilitate meaningful and automated evaluation of the assessment data especially for accreditation. The motivation in the development of CLOSO was to fill this gap to automate the preparation of course folders, perform quantitative evaluation of direct assessment data and help the academic departments to prepare and analyze CQI plans. Moreover, this software performs automated conversion of the CLO-based assessment data to SO-based assessment data.

Developed with the above motivations, CLOSO is an effective and sustainable software tool for automating the whole process of continuous improvement. It provides automation at two fronts:

1) Preparation of course folders for the instructors
2) Analysis and evaluation for coordinators and administrators

Based upon the analysis done by the software, important decisions can be taken and for the continuous improvement of the academic programs.

1.2 Functionality

CLOSO possesses numerous features. Some of these are:

1. **Convenience:** Easy data entry - mostly with clicks
2. **Grades Tracking:** CLO-wise tabulation of students' grades
3. **Satisfaction Data:** Calculates CLO & SO satisfaction
4. **Students' Survey:** Automatic analysis of students' survey data
5. **Instructor Feedback:** Instructors feedback and analysis
6. **Graphic Display:** Bar charts show the relative satisfaction

7. **Bell-shape Grades:** Automatic curve-up to bell shape grades
8. **Drastic Time Saving:** Instructors' time saving is drastic
9. **Accuracy and Reliability:** Error free data for SSR
10. **Loop-closing:** Loop-closing data input and analysis
11. **Single Database:** All syllabus data are maintained in a database

2 TERMINOLOGY

The terminology used in various academic institutions, programs and accrediting agencies may differ. CLOSO has the provision of customizing the terminologies conforming to the requirements of a particular institution/program/accrediting agency. By default, the software uses the terminologies adopted by Accreditation Board for Engineering and Technology (ABET). Throughout this manual, the default terminology is used and is briefly described in the following.

2.1 Program Educational Objectives (PEOs)

A program leading to bachelor or master degree in engineering is based on a set of "Program Educational Objectives" (PEOs) consistent with the mission of the institution. PEOs describe career and professional accomplishments expected from the graduates within a few years after graduation (ABET, 2013).

2.2 Student Outcomes (SOs)

To prepare the students so that they can achieve the PEOs, ABET accreditation process requires assessment and evaluation of a prescribed set of "Student Outcomes" (SOs). SOs describe the general abilities the students will acquire by the time of graduation (ABET, 2013; ABET, 2013). For ABET accreditation, the curriculum is designed so that the students achieve these outcomes through various courses. ABET accreditation "Criterion 3" requires that students demonstrate the attainment of eleven different SOs. These SOs are listed in Fig. 1. These outcomes may be modified or additional outcomes may be introduced to suit a particular program but most commonly the eleven SOs of ABET Criterion 3 are used without any modification.

CLOSO has the provision of specifying student outcomes from other accreditation commissions/agencies such as, computer science, applied sciences, management sciences and so on. When the administrator chooses the appropriate accreditation commission from the admin tool,

the software brings the relevant outcomes from its database. Further outcomes can be added in the existing list of outcomes by the administrator using the admin tool.

Engineering programs must demonstrate that their students attain the following outcomes:

a. an ability to apply knowledge of mathematics, science, and engineering
b. an ability to design and conduct experiments, as well as to analyze and interpret data
c. an ability to design a system, component, or process to meet desired needs within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability
d. an ability to function on multidisciplinary teams
e. an ability to identify, formulate, and solve engineering problems
f. an understanding of professional and ethical responsibility
g. an ability to communicate effectively
h. the broad education necessary to understand the impact of engineering solutions in a global, economic, environmental, and societal context
i. a recognition of the need for, and an ability to engage in life-long learning
j. a knowledge of contemporary issues
k. an ability to use the techniques, skills, and modern engineering tools necessary for engineering practice

Fig. 1: Student Outcomes as prescribed by ABET

2.3 Course Learning Outcomes (CLOs)

While SOs represent a set of general abilities to be attained by the students, the "Course Learning Outcomes" (CLOs) specified for all courses in a curriculum are specific to the content of the course and describe the course-related abilities students will acquire at the end of a course. It is essential that CLOs are distinct, non-overlapping and targeted to specific course-related skill levels (Felder & Brent, 2004). They also must be measurable through direct assessments. The questions asked in direct assessments like quizzes, homework and

examinations, always target one or more of the CLOs. Fig. 2 shows an example of CLOs for a course.

A student who successfully fulfills the course requirements will have demonstrated:

1. An ability to analyze/design electromagnetic circuits/devices.
2. An understanding of the concepts and principles of electromagnetic energy conversion.
3. An understanding of the concept of time-varying transformations in the analysis of time-varying systems.
4. An ability to analyze dc machines.
5. An understanding of converters for dc drives.

Fig. 2: An Example of Course Learning Outcomes

2.4 CLO-SO Map

It must be noted that SOs are not targeted directly in any course. The courses target CLOs. The abilities represented by the SOs are attained by the students through the CLOs in various courses. To identify those SOs that are attained through the CLOs in a particular course, a CLO-SO map is required. For example, CLO_1 in Fig. 2 is: "An ability to analyze/design electromagnetic circuits/devices". This CLO requires the use of mathematics, science and engineering therefore it maps to SO "a": "an ability to apply knowledge of mathematics, science, and engineering". The same CLO also requires an ability to use software that facilitates analysis and designing. Since the software is a modern engineering tool, CLO_1 also maps to SO "k": "An ability to use the techniques, skills, and modern engineering tools necessary for engineering practice". The complete CLO-SO map for the course is shown in Fig. 3. CLOs depend upon the contents and the objectives of a course as outlined in the program syllabus therefore it is possible that the same course in two different institutions have different sets of CLOs and consequently the CLO-SO map may also differ.

Course Learning Outcomes	Student Outcomes										
	a	***b***	***c***	***d***	***e***	***f***	***g***	***h***	***i***	***j***	***k***
1	1										1
2	1										1
3	1				1						1
4	1				1						1
5	1				1						1

Fig. 3: Mapping of Course Learning Outcomes (shown in Fig. 2) to Student Outcomes

2.5 Assessment

Homework assignments, examinations, quizzes, term-projects and presentations etc. are referred to as assessments. The administrator can choose a different name using the customization option of CLOSO Admin.

2.6 Semester

By default, CLOSO uses the terms "Fall", "Spring" and "Summer" semesters. It can be customized to any desired names using CLOSO Admin.

2.7 Academic Year

Academic year is assumed to start in Fall and is therefore indicated as xxxx-xx. For example 2012-13.

2.8 Raw Marks

Raw marks are the marks that the instructor uses for grading which could be much more than the actual contribution of the assessment towards the final grade. For example, an assessment could be designed such that it carries 100 marks, however, its contribution or weight towards the final grade could be only 5%.

2.9 Final Grade

This refers to the total marks earned by a student. Final grade is obtained by summing up the marks from all assessments. This terminology can be customized using the admin tool.

3 Basic Input

CLOSO has a powerful visual interface with tips guiding the user as the mouse pointer is moved. Most users learn to use the program without any manual just by trying CLOSO. Despite the efforts to make CLOSO a self-learning tool supported by this manual, users may have questions while using the software. Technical support is available to all users of CLOSO. They are encouraged to ask for assistance whenever they have any such questions.

This chapter describes the primary input required for a typical course using the instructor input window of CLOSO. The main window of CLOSO appears as shown in Fig. 4. Clicking on Instructor Input icon, brings up the Instructor Input Window as shown in Fig. 5. All the menu items are provided in the leftmost panel while the corresponding information/forms appear in the right panel of the window.

3.1 Course Information

If a new course folder is being prepared then as a first step the user has to enter basic information about the instructor and the course. This can be done in the opening window shown in Fig. 5. Then the user enters instructor information by clicking Instructor Information. Further details are discussed in Section 3.3. Other information to be entered by the user includes academic year, semester, number of assessments, class section and number of students.

The course is chosen from a drop down course list labeled "Course Name and Number". The course list with course names, credit hours and corresponding course numbers are also stored in the common syllabus file. Once a course is selected by the user, its corresponding CLOs are displayed in the middle part of the main window. The corresponding CLO-SO map is also shown besides "Course Information". The bottom-most part of the main window displays the student outcomes of the program.

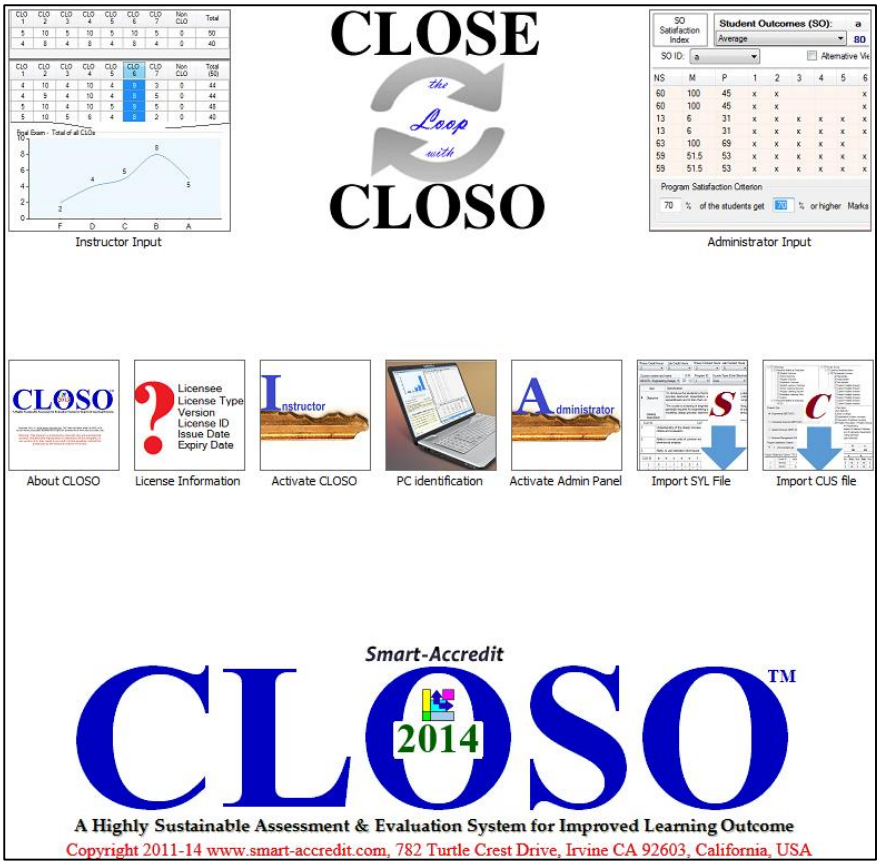


Fig. 4: Main CLOSO window

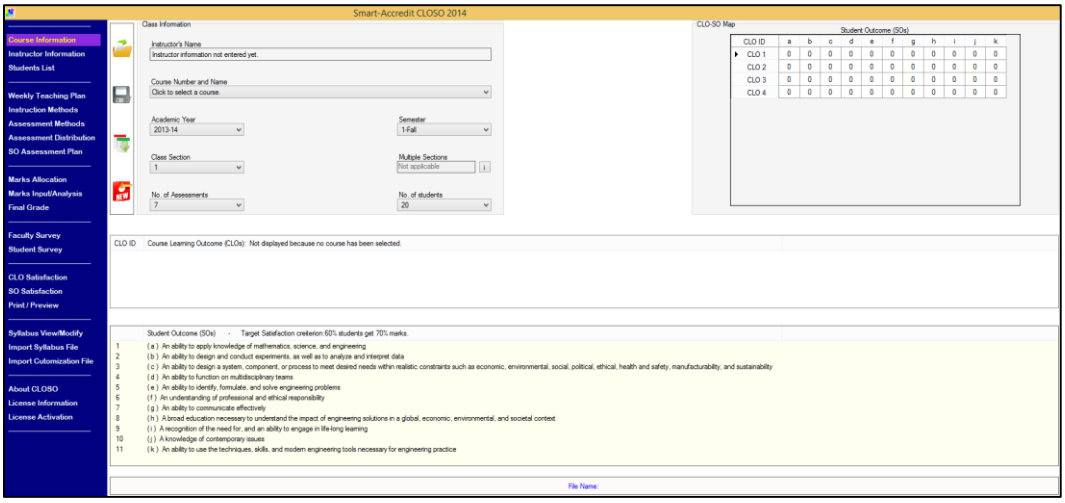


Fig. 5: Instructor input window

3.2 Saving, Opening and Creating Files

In order to open, save or create a new file from the beginning, four icons are provided on the instructor input window. Table 1 gives a summary of commands that can be accessed through these icons.

Table 1: Description of icons

	Icons	Function
1		Open an existing file
2		Save current file
3		Save file with a different name
4		Start a new file

3.3 Instructor Information

When a new file is created with CLOSO, one of the first steps is to enter instructor information. To do this, the user clicks Instructor Information. The instructor input window now displays a form as shown in Fig. 6. After entering the required information, the user can save the file by clicking Course Information and then clicking the save icon. The program suggests a meaningful name for the file having course name, instructor's name and other information that helps in identifying the file. The file saved by CLOSO has an extension of ".CLOSO" and can only be read by CLOSO.

3.4 Students List

To enter student information such as student IDs and names, the user clicks Students List and the window appears as shown in Fig. 7. Student IDs can be entered in the first column while the names can be entered in the second column. The list can be sorted either by ID or name by using the two buttons provided on the right side of the window. Rows can be added or deleted using "Add a row" and "Delete selected row" buttons respectively. To begin a new student list, the option "Fresh new list" can be used.

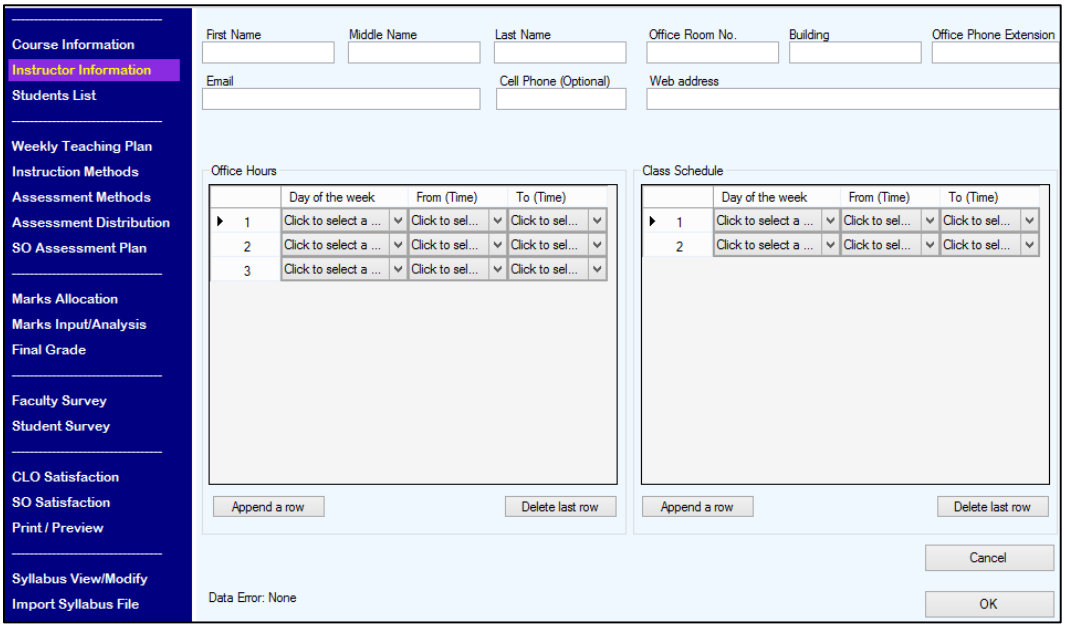


Fig. 6: Window for entering instructor information

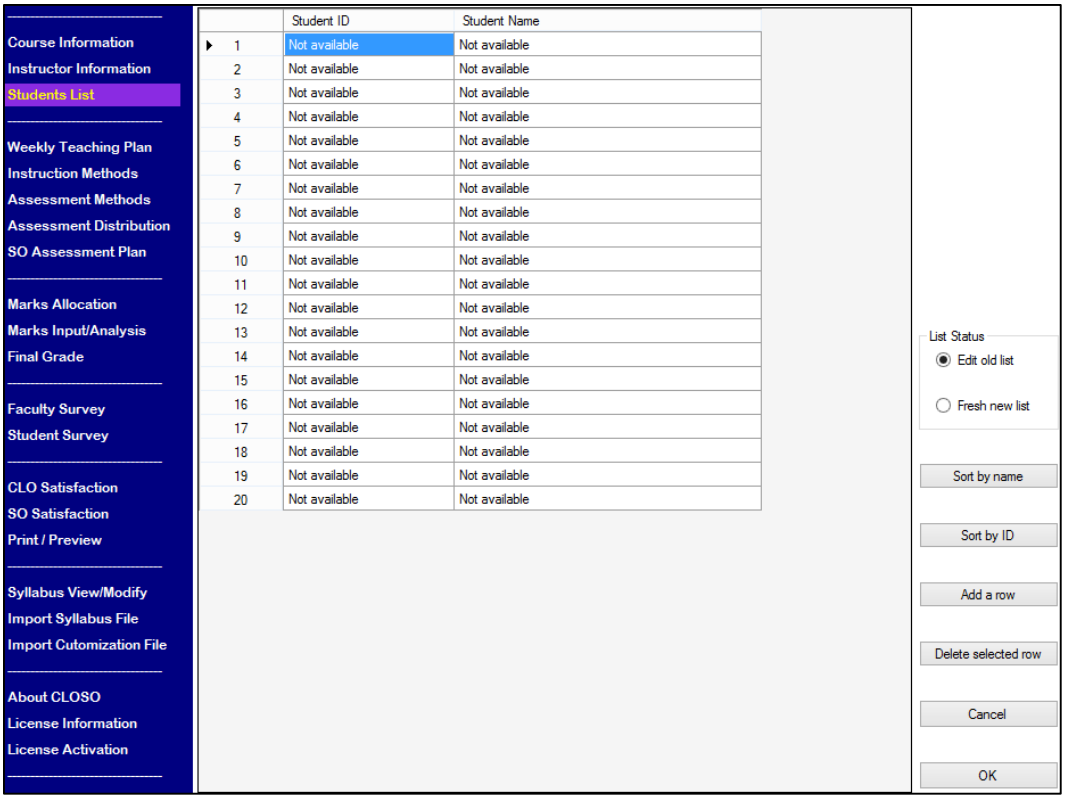


Fig. 7: Window for entering student information

4 INSTRUCTION PLAN

This chapter describes the five different components of Instruction Plan available to the instructor. These are described in detail in the following.

4.1 Weekly Teaching Plan

When the user clicks Weekly Teaching Plan from the left panel, a form appears as shown in Fig. 8. The purpose of this form is to give an estimated timeline for covering the course topics. By default, the software copies the course topics from the syllabus file and puts them under "Topics to be covered during class hours". User has the option to modify the language of the topics, add new topics (using the buttons "insert row above" or "insert row below") or delete topics (using the button "delete row"). If needed, the user can go back to the original course topics by clicking "Re-load" button if the topics have been modified. Moreover, row heights can be modified using the Row Height control given at the bottom of the form.

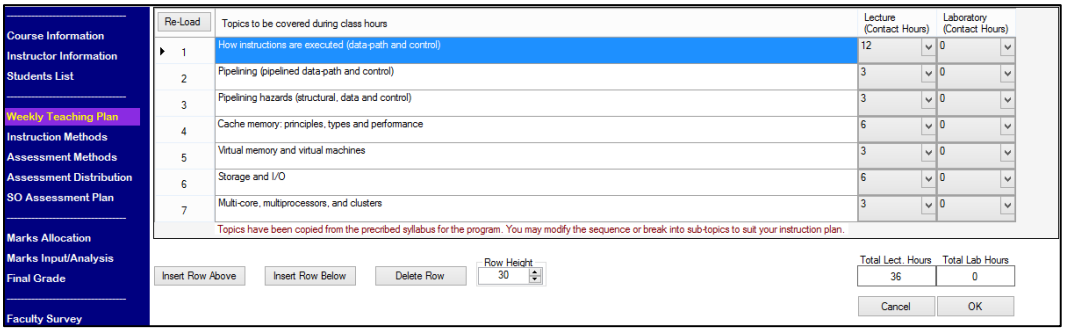

Course Information
Instructor Information
Students List
Weekly Teaching Plan
Instruction Methods
Assessment Methods
Assessment Distribution
SO Assessment Plan
Marks Allocation
Marks Input/Analysis
Final Grade
Faculty Survey
Re-Load
Topics to be covered during class hours
Lecture (Contact Hours)
Laboratory (Contact Hours)
1 How instructions are executed (data-path and control) 12 0
2 Pipelining (pipelined data-path and control) 3 0
3 Pipelining hazards (structural, data and control) 3 0
4 Cache memory: principles, types and performance 6 0
5 Virtual memory and virtual machines 3 0
6 Storage and I/O 6 0
7 Multi-core, multiprocessors, and clusters 3 0
Topics have been copied from the precribed syllabus for the program. You may modify the sequence or break into sub-topics to suit your instruction plan.
Insert Row Above
Insert Row Below
Delete Row
Row Height
30
Total Lect. Hours
36
Total Lab Hours
0
Cancel
OK

Fig. 8: Window for entering course topics

There are two columns on the right hand side for entering estimated contact hours for the topics. One column is used for putting lecture hours while the other for lab hours using the drop down lists.

4.2 Instruction Methods

This form appears when the user clicks Instruction Methods from the left panel and is shown in Fig. 9. These methods have been divided into several categories and different options are available in each category. User only needs to click the relevant box in case s/he is using the particular instruction method in the course. Depending upon the type of category, in some cases, the instructor can choose multiple options while in others only one option can be chosen.

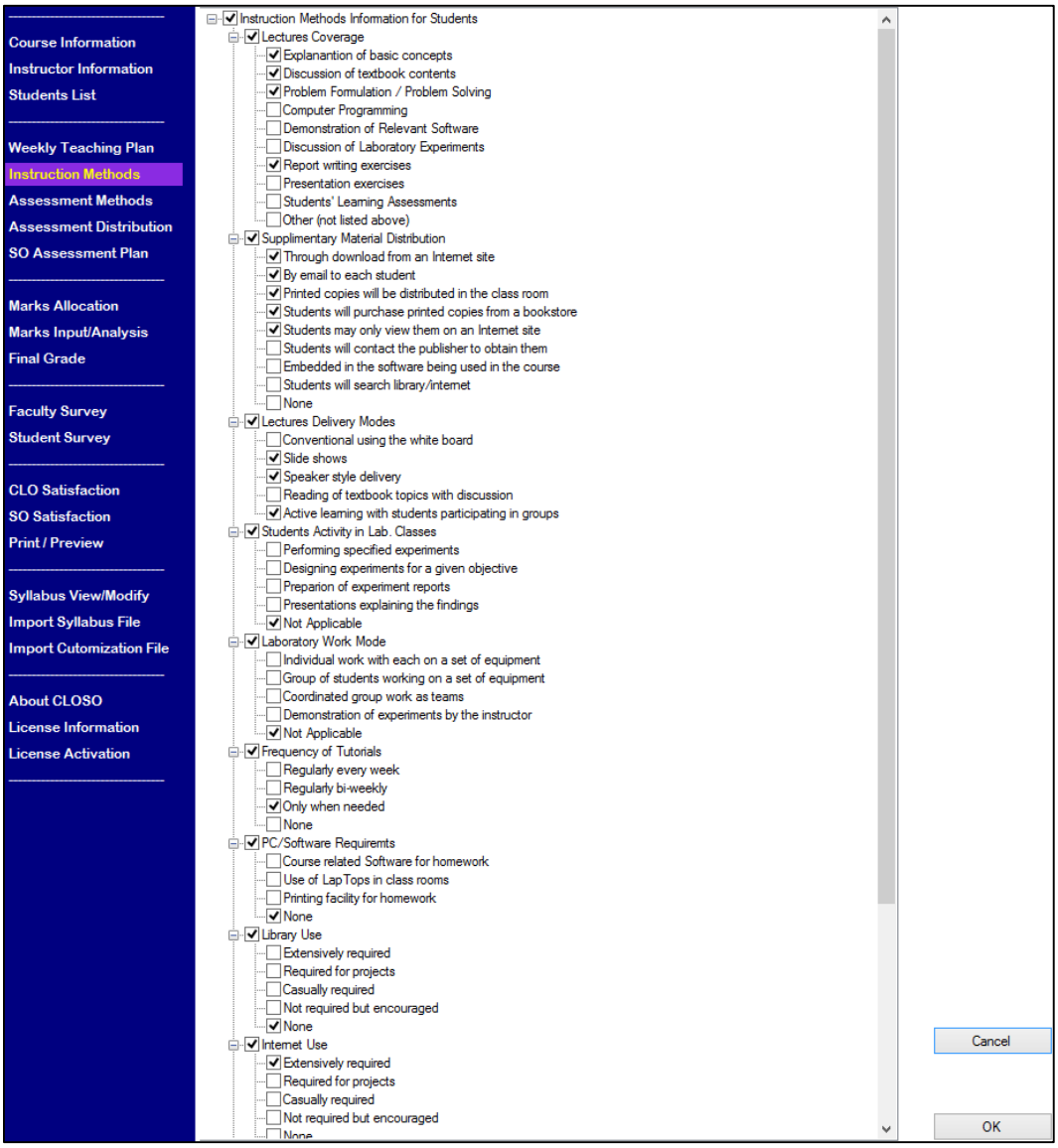


Fig. 9: Window for entering information about instruction methods

4.3 Assessment Methods

When the user clicks Assessment Methods, the form shown in Fig. 10 appears. In this window, the instructor shall give details of the assessment methods s/he intends to use. Several categories of assessment methods as well as properties of these methods have been provided. The instructor only needs to check the appropriate box under each category.

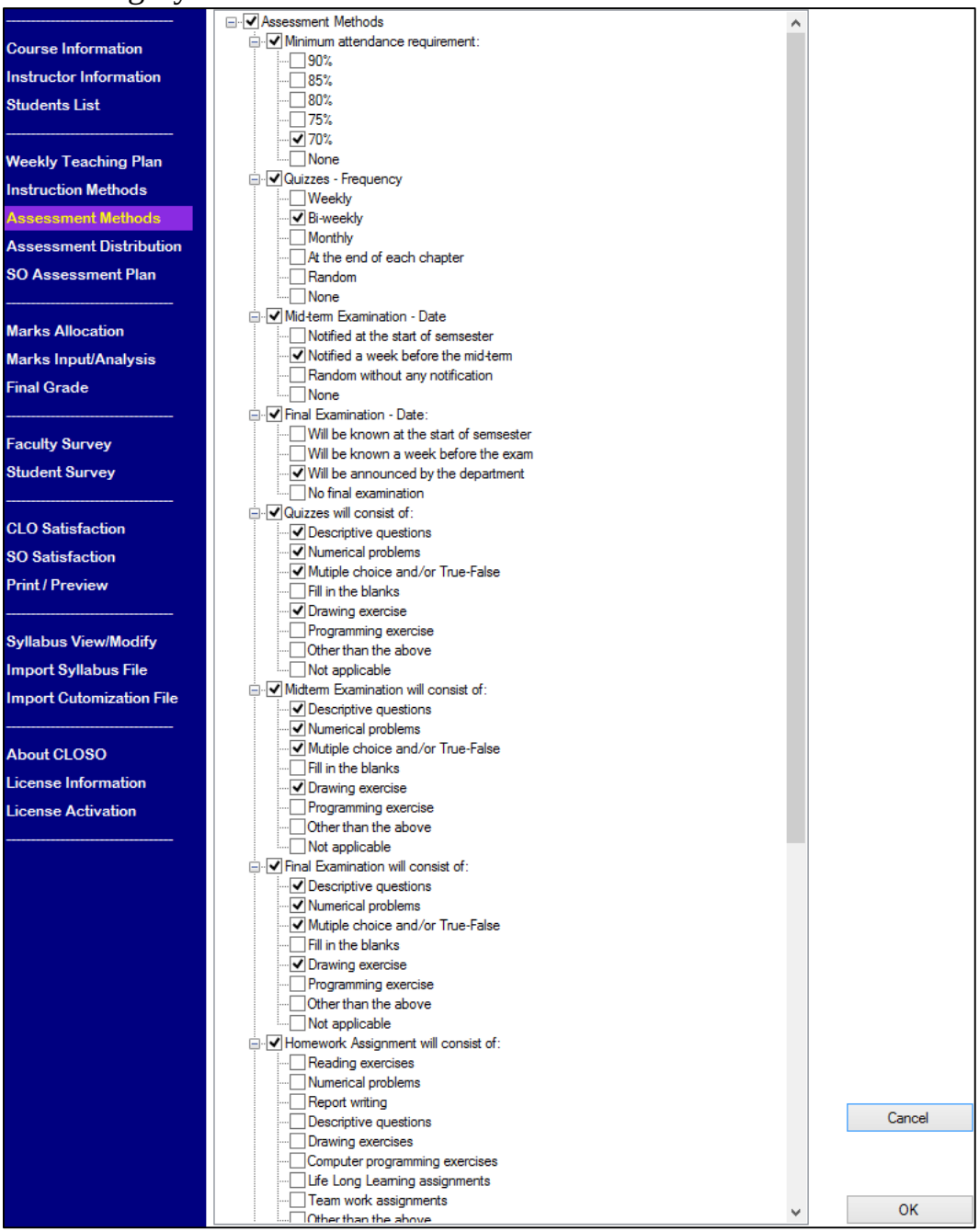


Fig. 10: Form for entering information about assessment methods

4.4 Assessment Distribution

When the user clicks Assessment Distribution, the window shown in Fig. 11 appears. In this window, the instructor can specify the percent marks that an assessment contributes towards the final grade. Several types of assessments are given in this window but the instructor needs to specify marks distribution only for those assessments that are covered in his/her course. All the assessments whose percent contribution is nonzero would be displayed with a dark maroon color to distinguish them from noncontributing assessments. The last line automatically totals all the contributions.

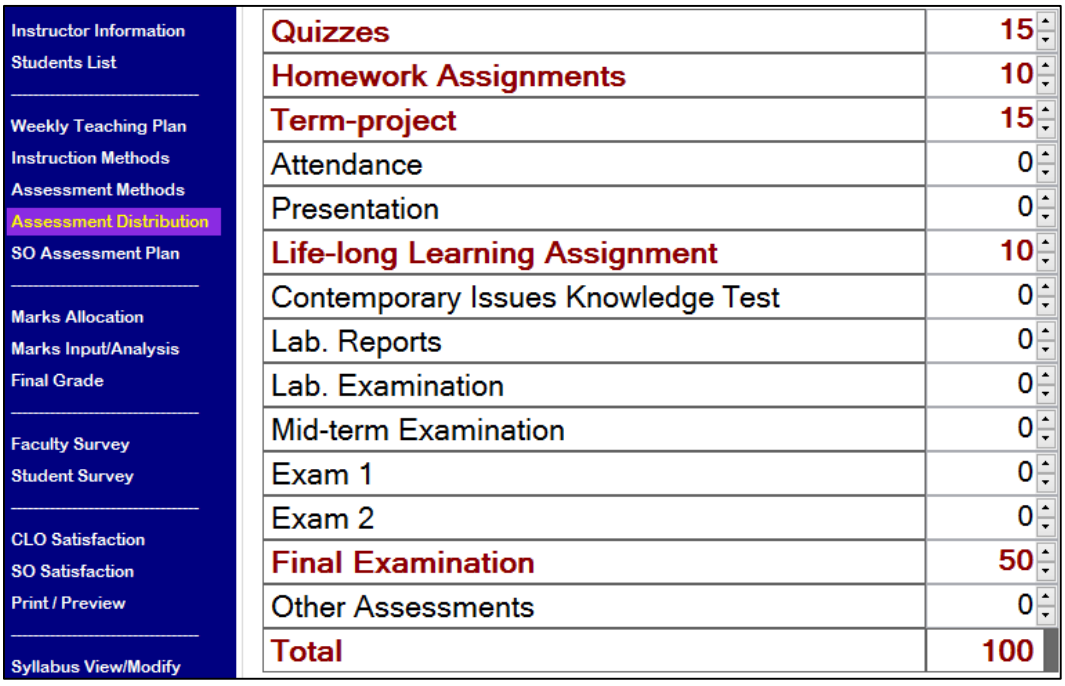


Fig. 11: An example of assessment distribution

4.5 SO Assessment Plan

Assessment of student outcomes is a key element in accreditation. For example, in ABET accreditation, the curriculum is designed so that the students achieve these outcomes through various courses. ABET accreditation "Criterion 3" requires that students demonstrate the attainment of eleven different SOs. These SOs are listed in Fig. 1. SOs may be modified or additional outcomes may be introduced to suit a particular program.

On the form entitled "SO Assessment Plan", the instructor gives information about how the student outcomes covered in his/her course will be assessed. As Fig. 12 shows, the software displays IDs of SOs covered in the particular course when the user clicks SO Assessment Plan. Three simple questions are asked for each SO and the user selects answers to each of the questions from the dropdown list. Table 2 shows the three questions and available choices for answering them.

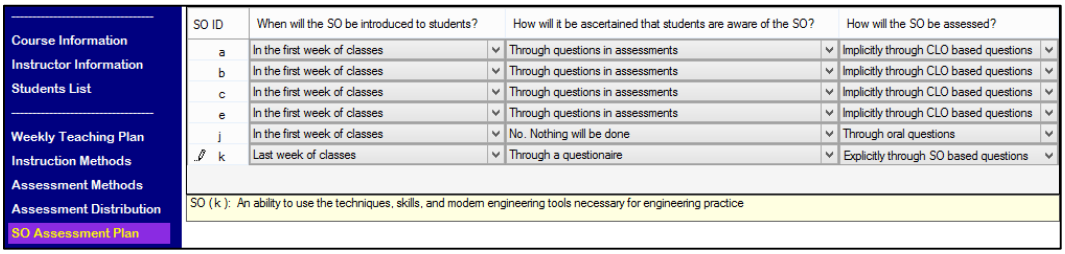

Course Information
Instructor Information
Students List
Weekly Teaching Plan
Instruction Methods
Assessment Methods
Assessment Distribution
SO Assessment Plan
SO ID
When will the SO be introduced to students?
How will it be ascertained that students are aware of the SO?
How will the SO be assessed?
a In the first week of classes Through questions in assessments Implicitly through CLO based questions
b In the first week of classes Through questions in assessments Implicitly through CLO based questions
c In the first week of classes Through questions in assessments Implicitly through CLO based questions
e In the first week of classes Through questions in assessments Implicitly through CLO based questions
j In the first week of classes No. Nothing will be done Through oral questions
k Last week of classes Through a questionaire Explicitly through SO based questions
SO (k): An ability to use the techniques, skills, and modern engineering tools necessary for engineering practice

Fig. 12: Form for entering SO assessment plan

Table 2: Possible choices for the three questions in SO assessment plan

When will the SO be introduced to students?	How will it be ascertained that students are aware of the SO?	How will the SO be assessed?
In the first week of classes	Through verbal cross-questioning	Implicitly through CLO based questions
In the second week of classes	Through a questionnaire	Explicitly through SO based questions
Any time before mid-term	Through questions in assessments	Through a presentation, student will make
After the mid-term	No. Nothing will be done	Through an assessment for this purpose
Last week of classes	-	Through oral questions
Never	-	Not applicable

5 Marks Management

Entering and managing student marks and grades is simple and easy in CLOSO. This chapter describes in detail the three options available to the instructor for managing student marks and grades.

5.1 Marks Allocation

The CLOs specified for all courses in a curriculum are specific to the content of the course and describe the course-related abilities students will acquire at the end of a course. The questions asked in direct assessments like quizzes, homework and examinations, always target one or more of the CLOs. When the instructor clicks Marks Allocation, a form shown in Fig. 13 opens. The purpose of this form is to help the instructor design his assessments such that all the questions are distributed amongst one or more CLOs.

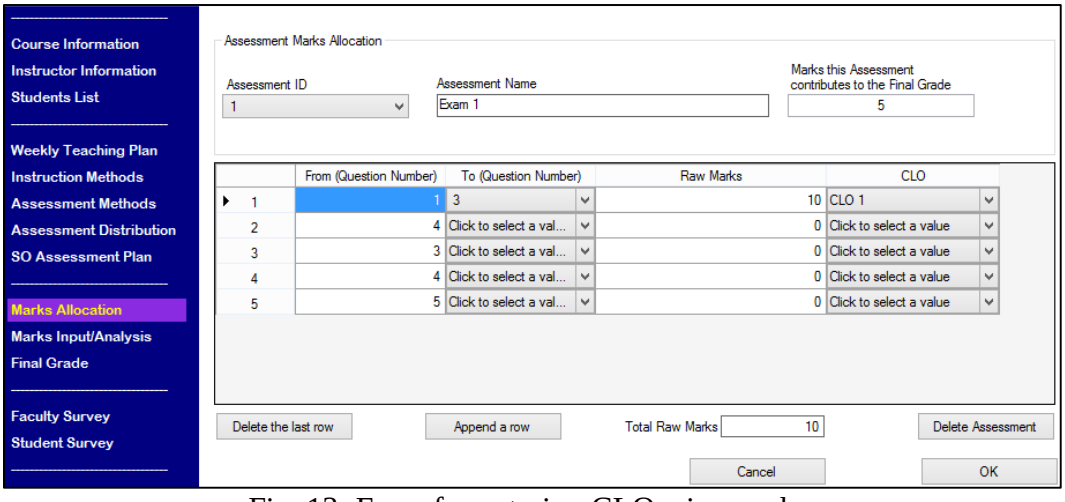


Fig. 13: Form for entering CLO wise marks

The upper part of the form contains information about "Assessment ID", "Assessment Name" and "Marks this assessment contributes to the final grade". Assessment IDs are unique integers from 1 to the

maximum number of assessments and can be chosen via the drop down menu. Each assessment ID has an associated assessment name entered by the instructor. Finally, the contribution of this assessment towards the final grade is entered in the field on the right hand side.

The middle part of this form has four columns for entering CLO wise questions, their associated marks and the CLOs they are addressing. The software automatically calculates and displays the total "raw" marks in a box shown at the bottom of the Figure. By "raw" marks we mean the marks that the instructor uses for grading which could be much more than the actual contribution of the assessment towards the final grade. For example, an assessment could be designed such that it carries 100 marks, however, its contribution or weight towards the final grade could be only 5%.

Finally, more rows to this table can be added by clicking the button "Append a row". Similarly, the last row can be deleted by clicking the button "Delete the last row". In order to delete an assessment, the button "Delete Assessment" can be used.

5.2 Marks Input/Analysis

When the user clicks Marks Input/Analysis, a window shown in Fig. 14 appears. Marks Input/Analysis has two modes: Raw Marks Input Mode and Marks Curve-up Mode. By default, this window appears in Raw Marks Input Mode. We describe the two modes in detail in the following.

5.2.1 Raw Marks Input Mode

As shown in Fig. 14, the window displays following information. On the left side it shows, 1) a summary of CLO wise marks allocation, 2) a table for entering students' marks, and 3) a table showing raw marks analysis for a given criterion. On the right side it shows, 1) marks input mode, 2) a graphical display of the performance of students through a bar chart, and 3) a line graph showing student satisfaction based upon student marks in all the CLOs.

5.2.1.1 Marks Input Table

The number of columns in this table is equal to the number of CLOs in the course plus one column for non-CLO marks and one column for displaying the totals. The marks can either be entered manually or

pasted from another application. The software stops the user from entering marks greater than the marks allocated to a particular CLO. To paste marks from another application, copy the marks either as a single or multiple columns, select the relevant cells in marks input table, right mouse click, and then choose "paste". The data will be copied.

If all the columns of the table for entering student marks do not fit in the given space, the button showing ">>" – available beneath the satisfaction table – can be clicked which will increase the width of the table. To squeeze, the button showing "<<" can be clicked. Similarly, to increase the height of this table, the button "Expand" – available at the top left corner of the table – can be clicked. This is a toggle button which will hide/show the satisfaction table thus increasing/decreasing the height of the marks input table.

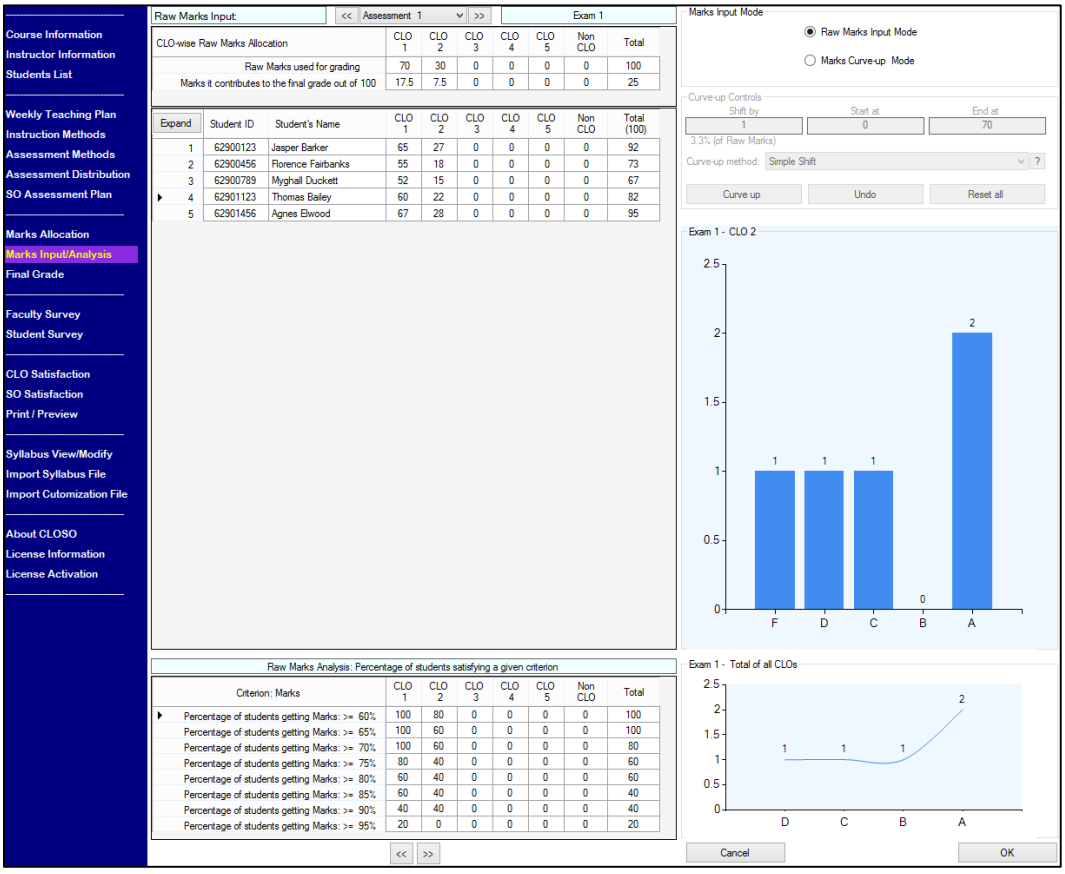


Fig. 14: Form for entering CLO based assessment data for all students

5.2.1.2 Bar Chart

The bar chart gives a visual summary of student performance. It shows the number of students in each grade for a given assessment and CLO. For example, in Fig. 14, the bar chart shows student performance for CLO_2 in assessment 1 (called Exam 1). The user can navigate through the assessments as well as CLOs to see student performance. If an assessment covers multiple CLOs, bar chart will be shown for the CLO that has been selected in the marks input table. If the user selects the column "Total", the bar chart shows displays grades based upon the total.

5.2.1.3 CLO wise Marks Allocation

An assessment can be selected using the drop down menu shown at top of the window. Beneath the selected assessment is an area that shows marks attributed to each CLO and its weight out of 100 in the final grade. For the example shown in Fig. 14, the assessment ID is 1 and its name is Exam 1. For this assessment the questions were related only to CLO_1 and CLO_2, and the assessment was graded out of 100 marks. This assessment contributes 25 marks out of 100 to the final grade while CLO_1 contributes 17.5 marks and CLO_2 contributes 7.5 marks to the final grade.

5.2.1.4 Raw Marks Analysis

The table beneath the raw marks input table displays the percentage of students passing various satisfaction criteria. For example, in the case shown in Fig. 14, 80% students earned marks $\geq$ 60% in CLO_2. The rightmost column displays the percentage of students satisfying various criteria for the total marks for all CLOs present in the assessment. In the example shown, 100% students got total marks $\geq$ 60% in the assessment.

5.2.2 Marks Curve-up Mode

When the user selects Marks Curve-up Mode, the window changes to what is shown in Fig. 15. Curve-up controls – shown on top right of Fig. 15 – which were disabled in Raw Marks Input Mode are now enabled.

There are six options in CLOSO for doing curve-up for a given assessment and CLO. An option can be chosen using the drop down

menu against Curve-up Methods available under Curve-up Controls. These options are: (1) Shift up, (2) Shift and round off, (3) Tilt top, (4) Tilt top and round off, (5) Tilt bottom, and (6) Tilt bottom and round off. A pictorial explanation of these options appears shown in Fig. 16 when the user presses the toggle button with a question mark on it located besides the curve up options list. The instructor selects a curve up method using the drop down list and then fills up values for "Shift by", "Start at" and "End at". "Shift by" specifies the amount by which the marks are to be shifted up, "Start at" and "End at" specify the range of marks on which the curve up method is to be applied. For example, an instructor wants to leave out students having extremely low marks as shifting up their marks with a reasonable value will not help them in any way. In such a case, he can specify a lower limit on the marks using "Start at" so that students who achieved marks equal to or less than "Start at" marks do not get any boost up. Next the instructor chooses the assessment and its corresponding CLO where s/he wishes to apply curve up. Finally, he presses the "Curve up" button to curve up the marks of the students.

5.2.2.1 Simple Shift

This is the simplest curve up option where the marks of all or selected students are moved up by a constant value specified in the box labeled "Shift by". The instructor can also specify the range of marks using "Start at" and "End at" boxes on which the shift up is to be applied. When the instructor presses the "Curve up" button, marks of students who fall in the specified range are shifted up by a constant value specified in the "Shift by" box.

5.2.2.2 Top Tilt

As the illustration in Fig. 16 shows, this method gives more credit to students with higher marks than students with lower marks. The value specified in "Shift by" is proportionally distributed amongst all the marks between "Start at" and "End at". For example, assume that the value of "Shift by" is 2, "Start at" is 0 and "End at" is 10. Also, assume that the maximum marks allocated to a particular CLO in an assessment are 10. A mark of 1 will be shifted up by 2/10 = 0.2, marks of 2 by (2 x 0.2), marks of 3 by (3 x 0.2) and so on. Of course, the software will ensure that after shifting up, the marks do not cross the maximum marks.

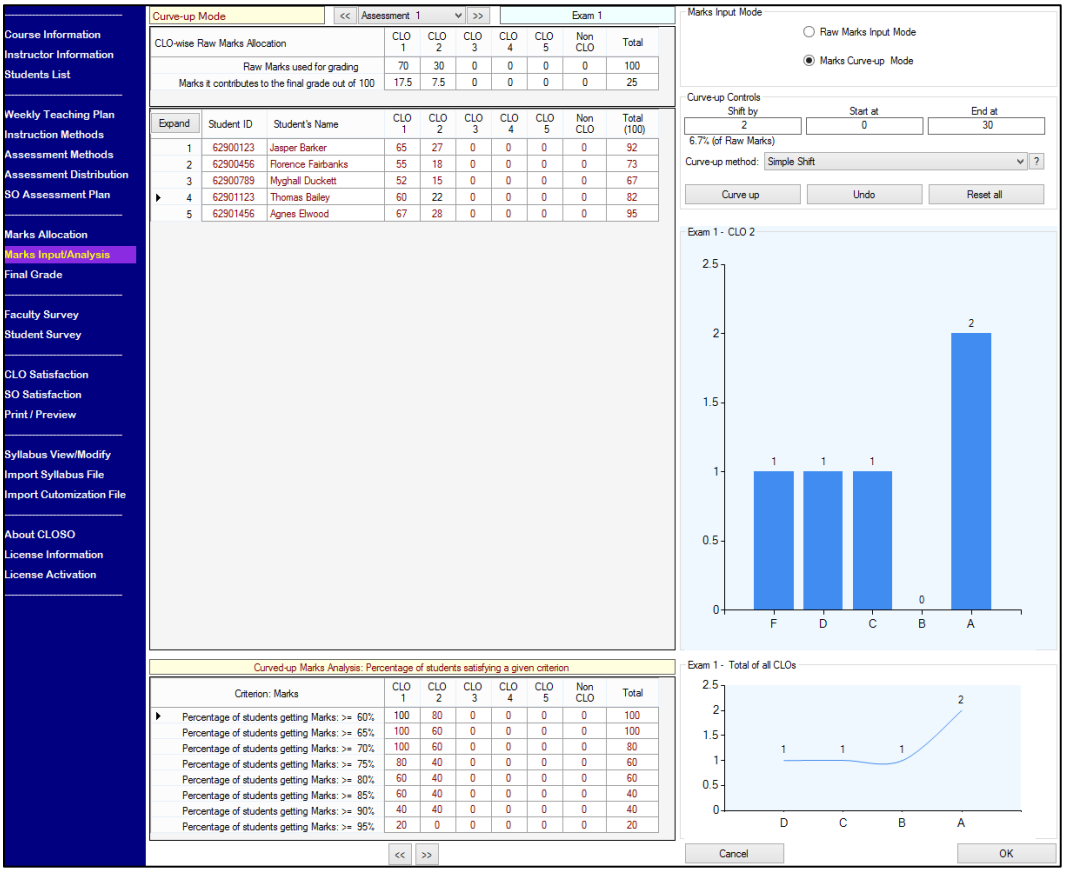


Fig. 15: Marks curve-up mode for fine tuning and normalizing student marks

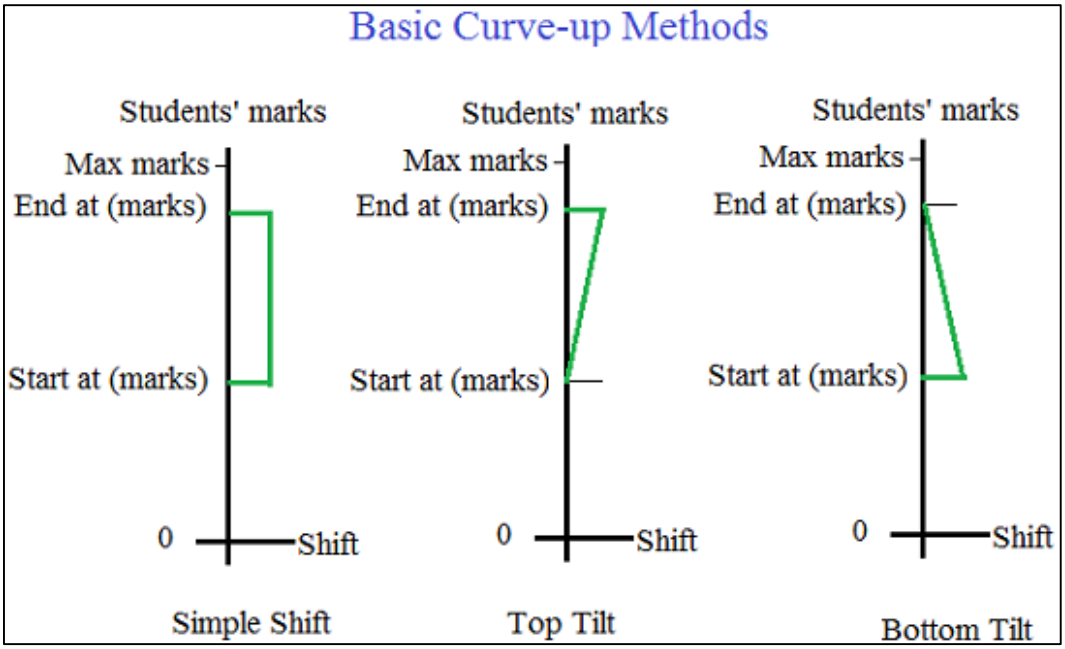


Fig. 16: Basic curve up methods available in CLOSO

5.2.2.3 Bottom Tilt

As opposed to "Top Tilt", this method gives more credit to students with lower marks than students with higher marks. It works the same way as the top tilt except that order is reversed. That is, in the example cited in Section 5.2.2.2, students getting 9 marks will be shifted up by 0.2, those with 8 marks by 0.4 and so on.

In all the above methods of curve up, the values obtained after curve up are rounded off to the nearest integer by the software if the round off option is also selected by choosing "Shift and round off", "Top tilt and round off", or "Bottom tilt and round off".

The most recent curve up can be undone using the button labeled "Undo". Also, the instructor can come back to original raw marks by clicking "Reset all". This will nullify the entire curve up operations done by the user.

5.3 Final Grade

When the user selects this mode, the resulting window is as shown in Fig. 17. The table showing marks of the students contains three columns namely, Raw Marks, Curved up Marks and Final Grades, besides two columns for student IDs and names. Right hand side of Fig. 17 shows distribution of grades in graphical format. Three plots for final grades are shown. The top plot is for raw marks, middle is for curved up marks and the last one is for Bell shaped marks. Details are described in the following.

5.3.1 Finalizing Grades to Bell-shape

This is one of the most striking features of this software. It is common in academics to normalize the final marks of students such that these marks form a bell shape. This normalization – sometimes known as relative marking – has arguments for and against it. Nevertheless, some kind of adjustment or fine tuning is almost always needed before finalizing the student grades. This tool is extremely useful doing these adjustments regardless of whether the marking is relative or absolute.

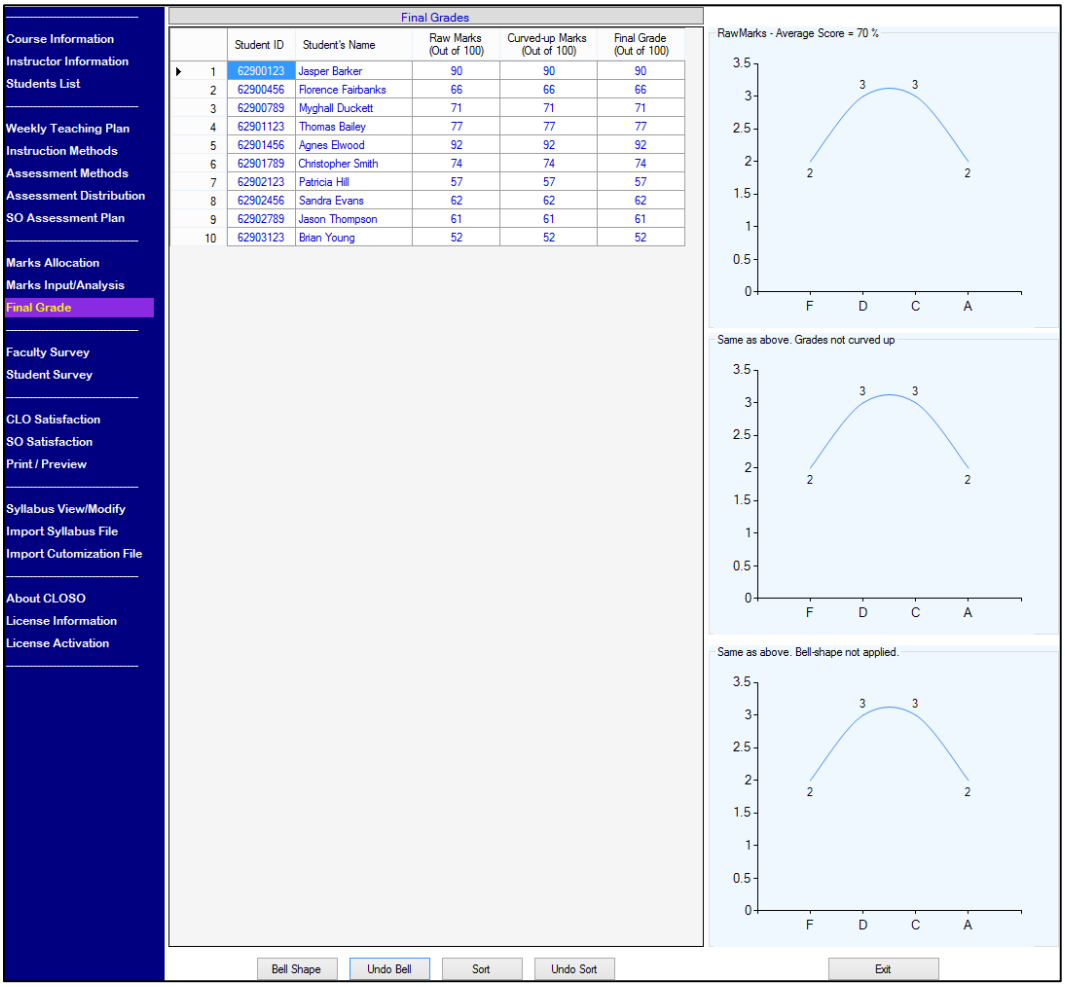


Fig. 17: Final grade

When the user clicks the button "Bell Shape", a small window shown in Fig. 18 appears. This window shows desired percentage of students in each grade in the well-known five-letter marking system (A-B-C-D-F). Percentage of students in grades A, B, D and F are specified by the instructor. Remaining number of students are calculated by the software and categorized as grade "C". In case the percentages specified are inappropriate, for example, number of "A" grades is more than number of "B" grades or, number of "F" grades is more than number of "D" grades, the software displays a message as shown in Fig. 19 and reverts back to the original values.

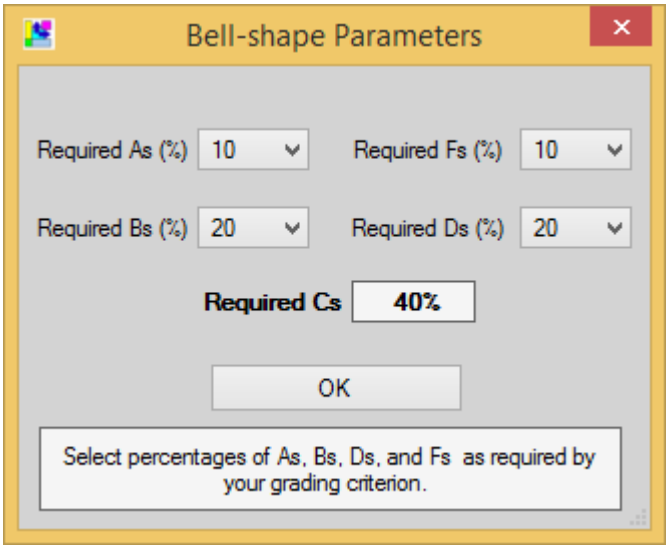

Bell-shape Parameters
Required As (%) 10
Required Fs (%) 10
Required Bs (%) 20
Required Ds (%) 20
Required Cs 40%
OK
Select percentages of As, Bs, Ds, and Fs as required by your grading criterion.

Fig. 18: Window for choosing parameters of Bell curve

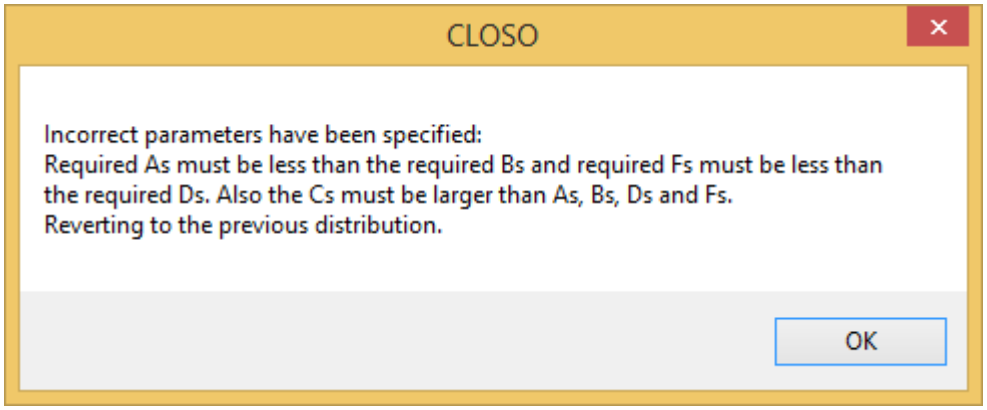

CLOSO
Incorrect parameters have been specified:
Required As must be less than the required Bs and required Fs must be less than the required Ds. Also the Cs must be larger than As, Bs, Ds and Fs.
Reverting to the previous distribution.
OK

Fig. 19: Message displayed by the software when incorrect parameters are specified for the Bell curve

Once the instructor chooses appropriate percentages for student grades using the dialog box shown in Fig. 18 and presses "OK", the software makes adjustments to student marks and tries to bring them to Bell shape as closely as possible (shown in Fig. 20). In doing so, it maintains fairness and does not alter the sequence of merit amongst students. As is evident from the graph shown in Fig. 20, the grades have been normalized to Bell shape for the example shown. Moreover, the software also displays a message shown in Fig. 21 asking if the user would like to update the assessment marks also as a result of Bell shaping the final grade. If the user clicks yes, the curve up marks are changed such that they reflect the Bell shaped distribution.

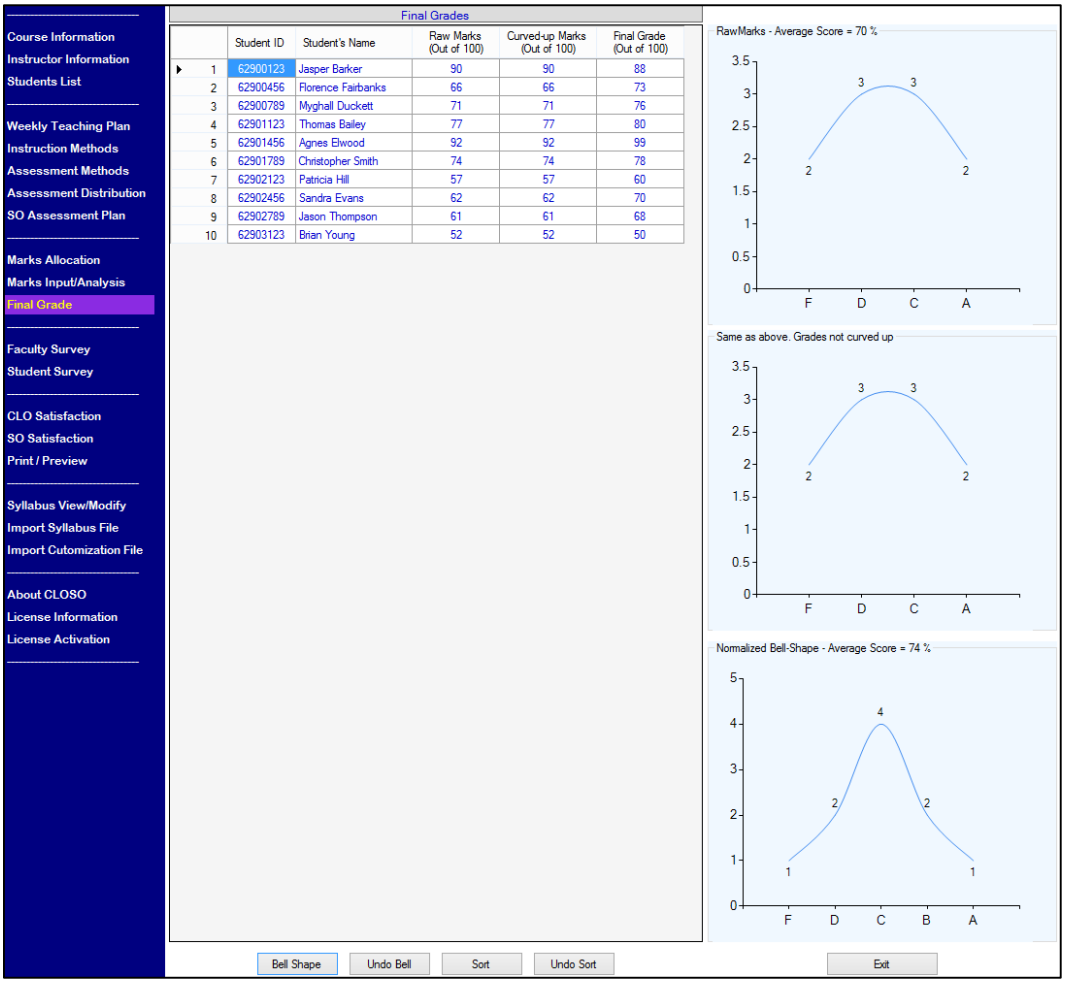


Fig. 20: Student grades after normalizing the marks to Bell-shape

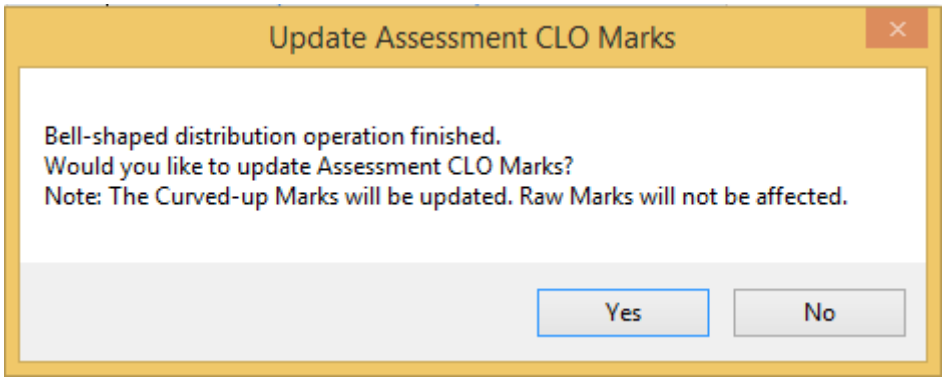

Update Assessment CLO Marks
Bell-shaped distribution operation finished.
Would you like to update Assessment CLO Marks?
Note: The Curved-up Marks will be updated. Raw Marks will not be affected.
Yes
No

Fig. 21: Window asking the user if s/he would like to update assessment marks

6 SURVEYS

Two types of surveys are available in CLOSO: Student Survey and Faculty Survey. The student survey records student perception of learning the CLOs while faculty survey records faculty feedback on several aspects such as, CLOs, student learning, facilities, suggestions to improve student learning, and identification of weakness and problems, etc. These surveys are described in detail in the following.

6.1 Faculty Survey

This is one of the most important forms as it gathers feedback of the faculty that plays a vital role in continuous improvement of a program. Faculty survey has six different categories as shown in Fig. 22. These are, 1) Learning Readiness, 2) Syllabus Coverage, 3) CLO Satisfaction, 4) Weaknesses, 5) Improvement Methods, and 6) SO Loop Closing. All these are described in detail in the following.

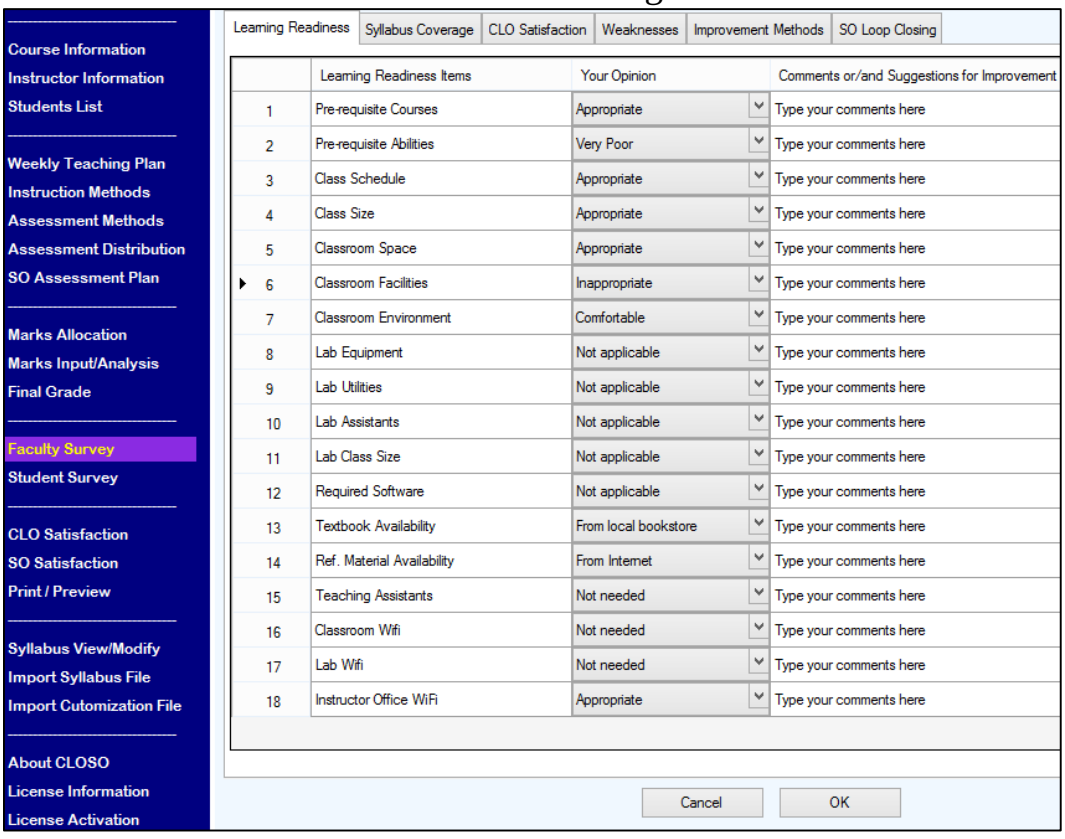

Course Information
Instructor Information
Students List
Weekly Teaching Plan
Instruction Methods
Assessment Methods
Assessment Distribution
SO Assessment Plan
Marks Allocation
Marks Input/Analysis
Final Grade
Faculty Survey
Student Survey
CLO Satisfaction
SO Satisfaction
Print / Preview
Syllabus View/Modify
Import Syllabus File
Import Cutomization File
About CLOSO
License Information
License Activation
Learning Readiness
Syllabus Coverage
CLO Satisfaction
Weaknesses
Improvement Methods
SO Loop Closing
Learning Readiness Items
Your Opinion
Comments or/and Suggestions for Improvement
1 Pre-requisite Courses Appropriate Type your comments here
2 Pre-requisite Abilities Very Poor Type your comments here
3 Class Schedule Appropriate Type your comments here
4 Class Size Appropriate Type your comments here
5 Classroom Space Appropriate Type your comments here
6 Classroom Facilities Inappropriate Type your comments here
7 Classroom Environment Comfortable Type your comments here
8 Lab Equipment Not applicable Type your comments here
9 Lab Utilities Not applicable Type your comments here
10 Lab Assistants Not applicable Type your comments here
11 Lab Class Size Not applicable Type your comments here
12 Required Software Not applicable Type your comments here
13 Textbook Availability From local bookstore Type your comments here
14 Ref. Material Availability From Internet Type your comments here
15 Teaching Assistants Not needed Type your comments here
16 Classroom Wifi Not needed Type your comments here
17 Lab Wifi Not needed Type your comments here
18 Instructor Office WiFi Appropriate Type your comments here
Cancel
OK

Fig. 22: Faculty survey showing the learning readiness tab

6.1.1 Learning Readiness

The learning readiness tab is shown in Fig. 22. It mainly covers faculty feedback on basic requirements for teaching a course such as prerequisite courses, classroom facilities and provision of teaching assistants etc. In order to save an instructor's valuable time, data entry has been made easy by providing dropdown menus for each item. The instructor can choose appropriate option for each issue by choosing an item from the drop down menu.

An instructor can also give comments and/or suggestions for improvement in the last column of the table. Furthermore, when the mouse pointer is moved over an issue, its explanation appears in the small yellow colored area beneath the table.

6.1.2 Syllabus Coverage

Fig. 23 shows syllabus coverage tab. The software automatically picks syllabus topics from the syllabus file and displays in the second column. In the third column, the instructor gives his perception about preparation of students in each syllabus topic at the conclusion of the course. The instructor may choose "Adequate" which means that in general, students learnt the topic well. Selecting "Inadequate" would mean that in general, the students didn't learn the topic well. In case the topic was not taught for any reason, the instructor chooses "Not taught". In the last column, the instructor enters the name of the assessment that covered the corresponding syllabus topic. If a particular topic was assessed in more than one assessment, the instructor would choose the name of only one assessment.

6.1.3 CLO Satisfaction

While the student survey gathers student perception of attainment of CLOs as discussed in Section 6.16.2, this form gathers the instructor perception of attainment of CLOs. The software copies the CLO statements from the syllabus file and displays in the second column as shown in Fig. 24. The instructor selects an achievement score from the third column using a drop down list where number 5 designates "Strongly Agree" and the number 1 designates "Strongly Disagree".

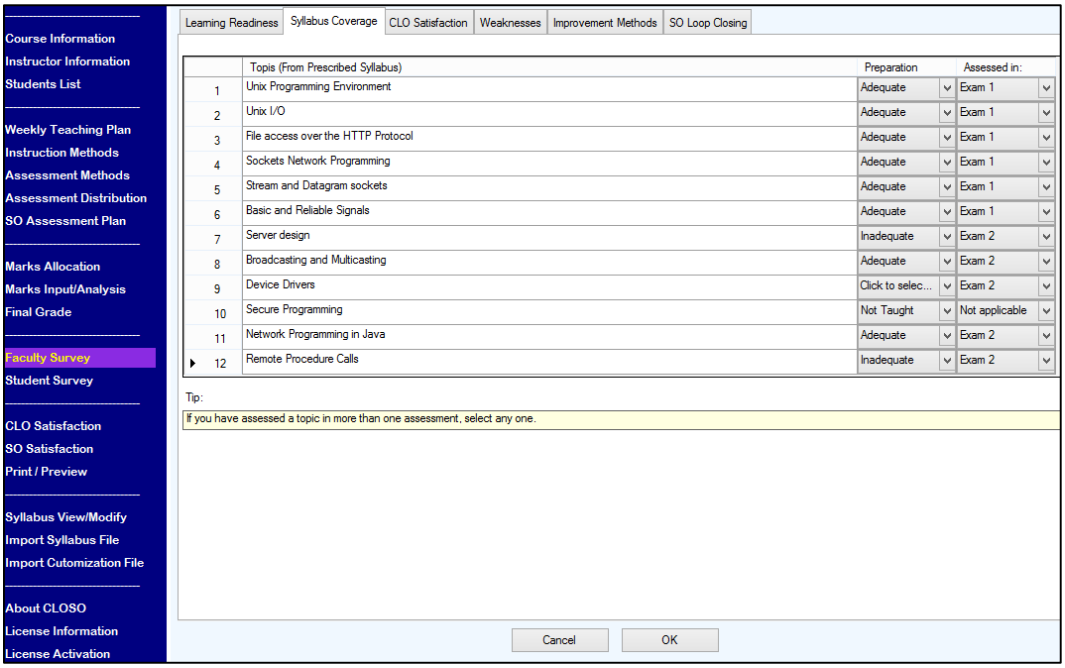


Fig. 23: Syllabus coverage tab in faculty survey

6.1.4 Weaknesses

Fig. 25 shows the "Weaknesses" tab within the faculty survey. There are 17 items on this form along with a checkbox against each item. If the checkbox is ticked it indicates a "yes" otherwise a "no". An instructor simply ticks the appropriate checkboxes to identify weaknesses that pertain to his/her course. The last item, i.e., the 17th item gives provision to the instructor for identifying weakness(es) that has/have not been covered in the 16 items already listed.

6.1.5 Improvement Methods

The "Improvement Methods" tab is shown in Fig. 26. There are 17 items on this form along with a checkbox against each item. If the checkbox is ticked it indicates a "yes" otherwise a "no". An instructor simply ticks the appropriate checkboxes to recommend an improvement that in his/her opinion would improve student learning. The last item, i.e., the 17th item gives provision to the instructor for recommending improvement method(s) that has/have not been covered in the 16 items already listed.

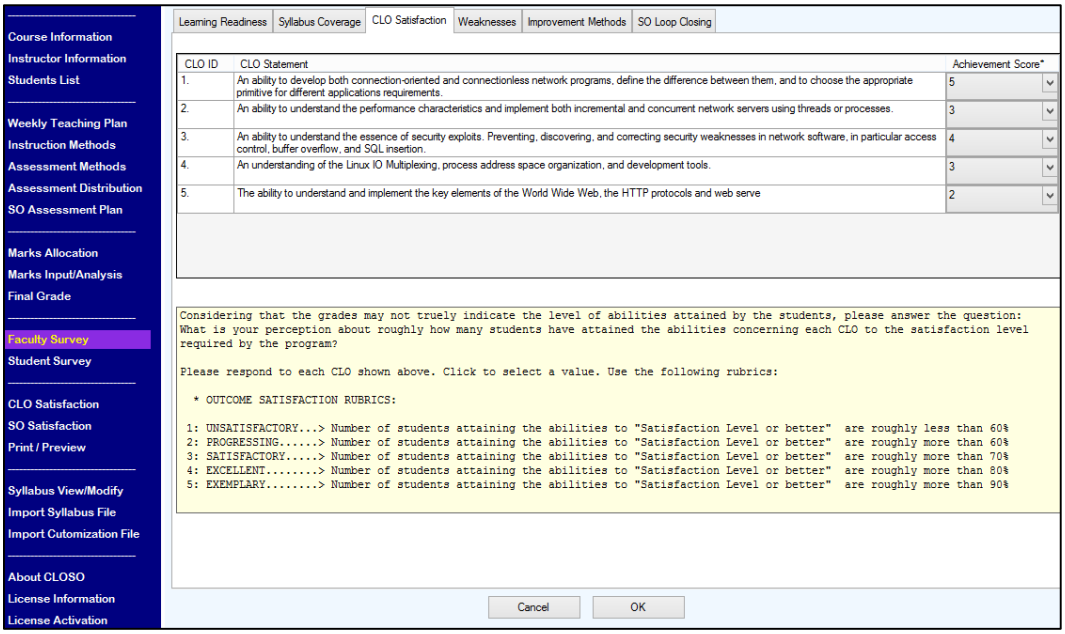

Course Information
Instructor Information
Students List
Weekly Teaching Plan
Instruction Methods
Assessment Methods
Assessment Distribution
SO Assessment Plan
Marks Allocation
Marks Input/Analysis
Final Grade
Faculty Survey
Student Survey
CLO Satisfaction
SO Satisfaction
Print / Preview
Syllabus View/Modify
Import Syllabus File
Import Cutomization File
About CLOSO
License Information
License Activation
Learning Readiness
Syllabus Coverage
CLO Satisfaction
Weaknesses
Improvement Methods
SO Loop Closing
CLO ID
CLO Statement
Achievement Score*
1. An ability to develop both connection-oriented and connectionless network programs, define the difference between them, and to choose the appropriate primitive for different applications requirements. 5
2. An ability to understand the performance characteristics and implement both incremental and concurrent network servers using threads or processes. 3
3. An ability to understand the essence of security exploits. Preventing, discovering, and correcting security weaknesses in network software, in particular access control, buffer overflow, and SQL insertion. 4
4. An understanding of the Linux IO Multiplexing, process address space organization, and development tools. 3
5. The ability to understand and implement the key elements of the World Wide Web, the HTTP protocols and web serve 2
Considering that the grades may not truely indicate the level of abilities attained by the students, please answer the question:
What is your perception about roughly how many students have attained the abilities concerning each CLO to the satisfaction level required by the program?
Please respond to each CLO shown above. Click to select a value. Use the following rubrics:
* OUTCOME SATISFACTION RUBRICS:
1: UNSATISFACTORY...> Number of students attaining the abilities to "Satisfaction Level or better" are roughly less than 60%
2: PROGRESSING.....> Number of students attaining the abilities to "Satisfaction Level or better" are roughly more than 60%
3: SATISFACTORY.....> Number of students attaining the abilities to "Satisfaction Level or better" are roughly more than 70%
4: EXCELLENT.....> Number of students attaining the abilities to "Satisfaction Level or better" are roughly more than 80%
5: EXEMPLARY.....> Number of students attaining the abilities to "Satisfaction Level or better" are roughly more than 90%
Cancel
OK

Fig. 24: CLO satisfaction tab in faculty survey

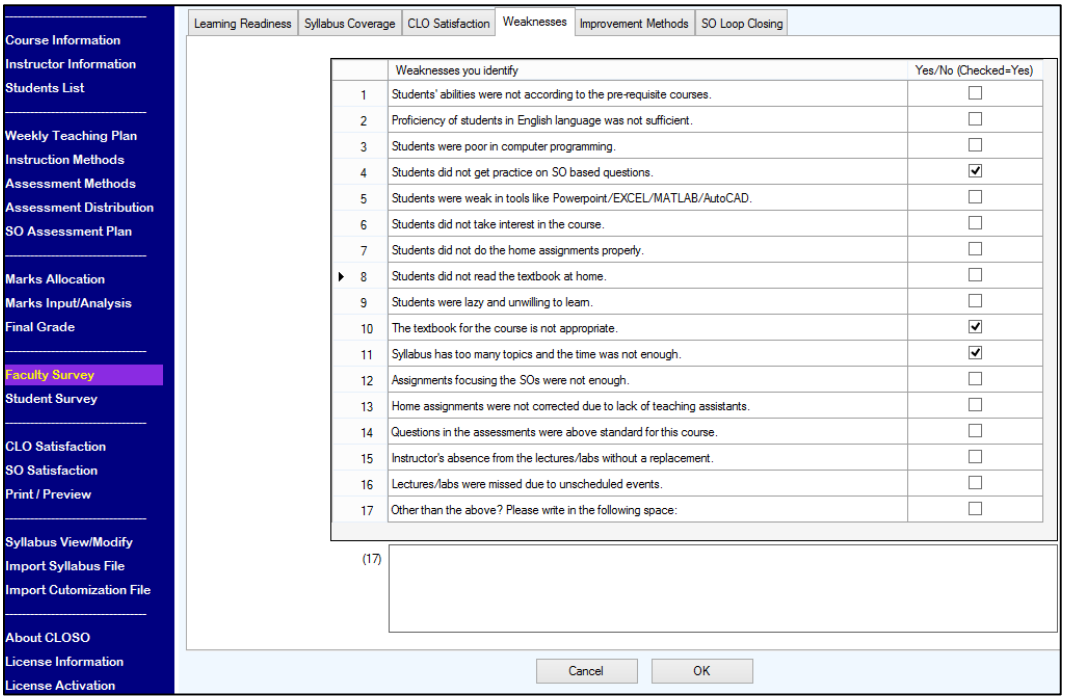
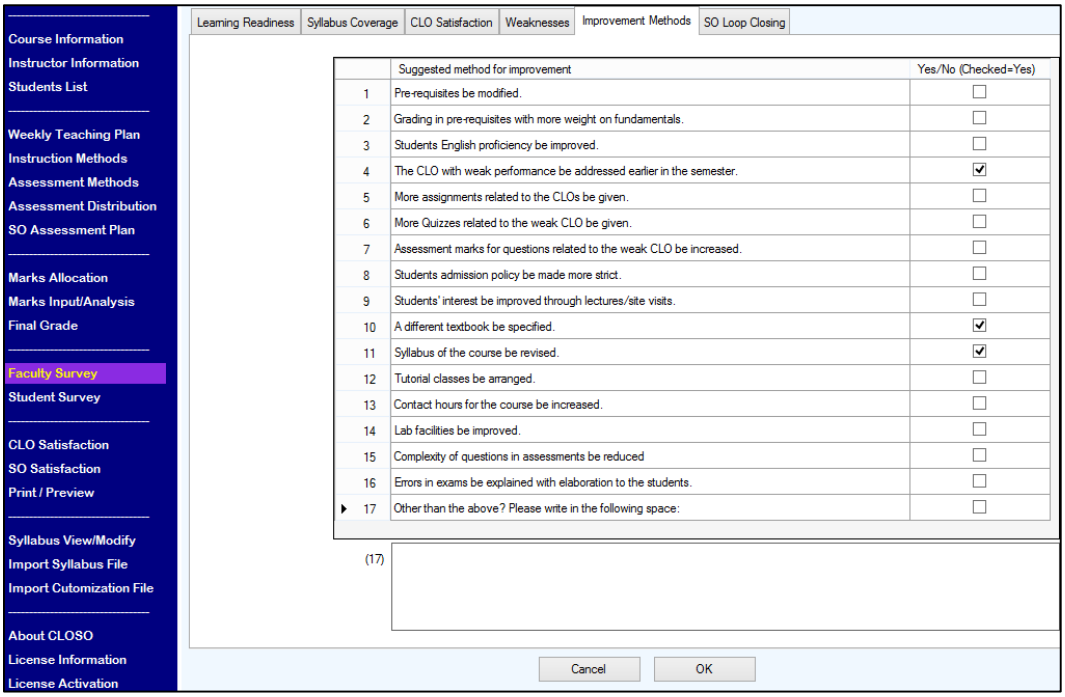

Course Information
Instructor Information
Students List
Weekly Teaching Plan
Instruction Methods
Assessment Methods
Assessment Distribution
SO Assessment Plan
Marks Allocation
Marks Input/Analysis
Final Grade
Faculty Survey
Student Survey
CLO Satisfaction
SO Satisfaction
Print / Preview
Syllabus View/Modify
Import Syllabus File
Import Cutomization File
About CLOSO
License Information
License Activation
Learning Readiness
Syllabus Coverage
CLO Satisfaction
Weaknesses
Improvement Methods
SO Loop Closing
Weaknesses you identify
Yes/No (Checked=Yes)
1 Students' abilities were not according to the pre-requisite courses.
2 Proficiency of students in English language was not sufficient.
3 Students were poor in computer programming.
4 Students did not get practice on SO based questions.
5 Students were weak in tools like Powerpoint/EXCEL/MATLAB/AutoCAD.
6 Students did not take interest in the course.
7 Students did not do the home assignments properly.
8 Students did not read the textbook at home.
9 Students were lazy and unwilling to learn.
10 The textbook for the course is not appropriate.
11 Syllabus has too many topics and the time was not enough.
12 Assignments focusing the SOs were not enough.
13 Home assignments were not corrected due to lack of teaching assistants.
14 Questions in the assessments were above standard for this course.
15 Instructor's absence from the lectures/labs without a replacement.
16 Lectures/labs were missed due to unscheduled events.
17 Other than the above? Please write in the following space:
(17)
Cancel
OK

Fig. 25: Weaknesses tab in faculty survey


Course Information
Instructor Information
Students List
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Instruction Methods
Assessment Methods
Assessment Distribution
SO Assessment Plan
Marks Allocation
Marks Input/Analysis
Final Grade
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Import Cutomization File
About CLOSO
License Information
License Activation
Learning Readiness
Syllabus Coverage
CLO Satisfaction
Weaknesses
Improvement Methods
SO Loop Closing
Suggested method for improvement
Yes/No (Checked=Yes)
1 Pre-requisites be modified.
2 Grading in pre-requisites with more weight on fundamentals.
3 Students English proficiency be improved.
4 The CLO with weak performance be addressed earlier in the semester.
5 More assignments related to the CLOs be given.
6 More Quizzes related to the weak CLO be given.
7 Assessment marks for questions related to the weak CLO be increased.
8 Students admission policy be made more strict.
9 Students' interest be improved through lectures/site visits.
10 A different textbook be specified.
11 Syllabus of the course be revised.
12 Tutorial classes be arranged.
13 Contact hours for the course be increased.
14 Lab facilities be improved.
15 Complexity of questions in assessments be reduced
16 Errors in exams be explained with elaboration to the students.
17 Other than the above? Please write in the following space:
(17)
Cancel
OK

Fig. 26: Improvement methods tab in faculty survey

6.1.6 SO Loop Closing

Loop closing is the most important part of continuous improvement. An improvement cycle in an academic program is said to have closed the loop if it consists of the following steps:

1. gather evidence through direct and indirect assessments
2. analyze evidence for attainment of PEOs and SOs
3. prepare an improvement plan and implement
4. gather evidence if the improvement plan worked
5. go back to step 1

As has been shown in previous sections, this software provides tools to the instructors to gather direct assessment results. Moreover, it helps them to gather indirect assessment results in the form of student and faculty surveys. This information is to be analyzed by an "Assessment & Evaluation Committee" that also prepares and implements an improvement plan. The presented software provides a tool in the form of "SO Loop Closing" to help instructors gather evidence if the improvement plan worked. This tool is shown in Fig. 27.

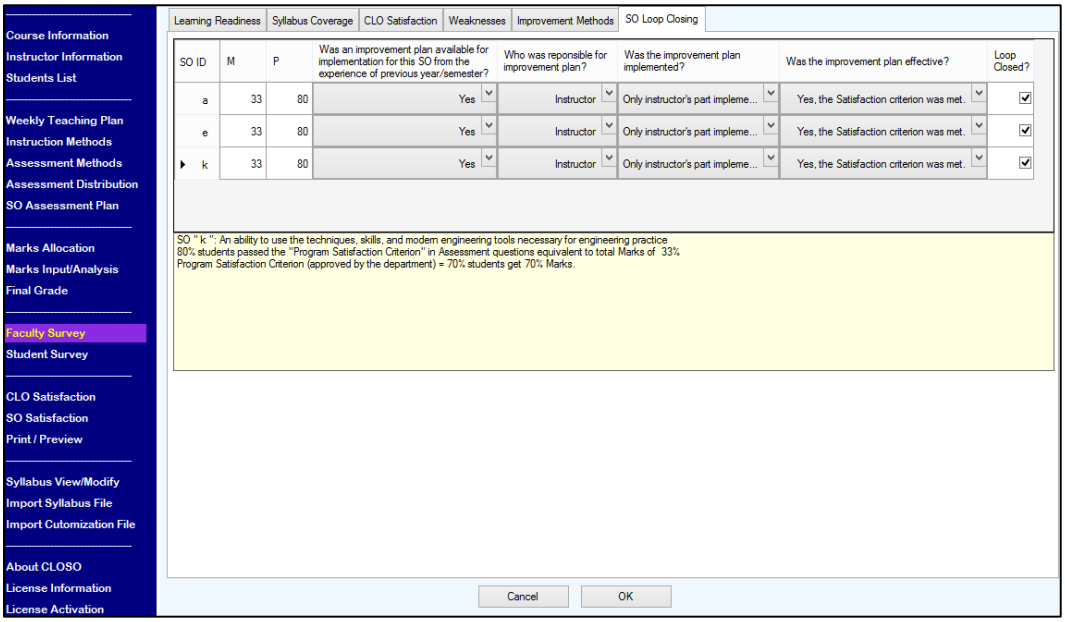
Course Information
Instructor Information
Students List
Weekly Teaching Plan
Instruction Methods
Assessment Methods
Assessment Distribution
SO Assessment Plan
Marks Allocation
Marks Input/Analysis
Final Grade
Faculty Survey
Student Survey
CLO Satisfaction
SO Satisfaction
Print / Preview
Syllabus View/Modify
Import Syllabus File
Import Cutomization File
About CLOSO
License Information
License Activation
Learning Readiness
Syllabus Coverage
CLO Satisfaction
Weaknesses
Improvement Methods
SO Loop Closing
SO ID
M
P
Was an improvement plan available for implementation for this SO from the experience of previous year/semester?
Who was reponsible for improvement plan?
Was the improvement plan implemented?
Was the improvement plan effective?
Loop Closed?
a 33 80 Yes Instructor Only instructor's part impleme... Yes, the Satisfaction criterion was met.
e 33 80 Yes Instructor Only instructor's part impleme... Yes, the Satisfaction criterion was met.
k 33 80 Yes Instructor Only instructor's part impleme... Yes, the Satisfaction criterion was met.
SO " k ": An ability to use the techniques, skills, and modern engineering tools necessary for engineering practice
80% students passed the "Program Satisfaction Criterion" in Assessment questions equivalent to total Marks of 33%
Program Satisfaction Criterion (approved by the department) = 70% students get 70% Marks.
Cancel
OK

Fig. 27: SO loop closing tab

SOs covered by the course are enlisted in the first column under the label "SO ID". The next column shows percent marks that were allocated to each SO while the third column shows percentage of students who satisfied the particular SO. Subsequent four columns ask one question each for the SOs covered by the course regarding an improvement plan and loop closing. Depending upon the nature of each question, appropriate options are given in a dropdown list to help the instructor answer the question. Table 3 enlists the questions along with all possible answering choices. If the improvement plan worked and the outcome has improved as compared with last offering of the course, the instructor ticks the relevant checkbox in the last column of "SO loop closing" tab shown in Fig. 27.

At the bottom of the loop closing table is a small area that is used to convey important information. Depending upon the row over which the mouse pointer is being moved, the box at the bottom displays three pieces of information: 1) the wordings of the relevant SO as defined by the accreditation organization, e.g., ABET, 2) meaning of the numbers in column two (labeled "M") and column three (labeled "P"), and 3) the approved program satisfaction criterion.

Table 3: Questions and possible options for answers while closing the loop

Questions	Answering Options					
Was an improvement plan available for implementation for this SO based on experience of previous semester/year?	Yes	No	N/A	-	-	-
Who was responsible for improvement plan?	Instructor	Department	Instructor & Department	N/A	-	-
Was the improvement plan implemented?	Yes, all parts implemented	Only instructor's part implemented	Only department's part implemented	Nothing was implemented	N/A	-
Was the improvement plan effective in improving the outcome?	Yes, satisfaction criterion was met	Yes, but improvement was not enough	Yes, but improvement was insignificant	No, was not at all effective	No, the outcome went down	N/A

6.2 Student Survey

When the instructor clicks "Student Survey" a window shown in Fig. 28 appears. This window has five parts: 1) a bar chart on top left side, 2) input mode along with tips beneath the bar chart, 3) explanation of rubrics used for the survey, 4) a table on top right for entering student responses, and 5) a summary of student response in the form of a table at the bottom right of the window. A small box beneath the summary table displays an average of all the responses. These are now described in detail in the following.

6.2.1 Entering Student Responses

For each CLO, students give their perception of how well they have learned it by choosing numbers from 5 to 1 where 5 represents "Strongly agree" and 1 represents "Strongly disagree". Student responses are entered in the table shown in the top right part of Fig. 28. The first column has student numbers. In addition, there is a column for each CLO. There are two ways to enter data: 1) manually after choosing appropriate option from the bottom of the table and 2) copying and

pasting from other sources after choosing appropriate option from the bottom of the table. The two methods are described below:

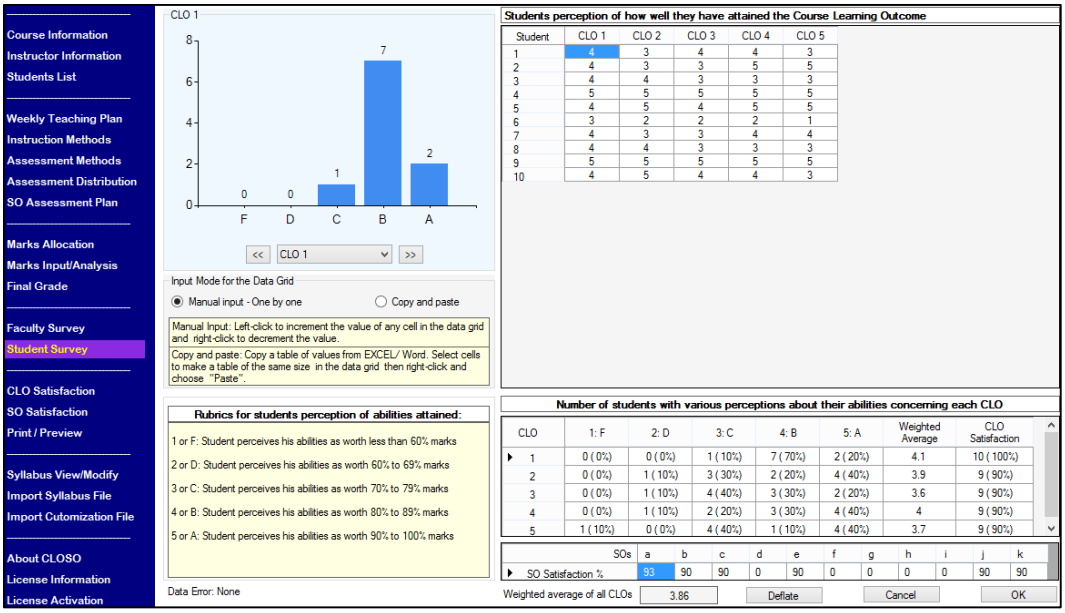
Course Information
Instructor Information
Students List
Weekly Teaching Plan
Instruction Methods
Assessment Methods
Assessment Distribution
SO Assessment Plan
Marks Allocation
Marks Input/Analysis
Final Grade
Faculty Survey
Student Survey
CLO Satisfaction
SO Satisfaction
Print / Preview
Syllabus View/Modify
Import Syllabus File
Import Cutomization File
About CLOSO
License Information
License Activation
CLO 1
F D C B A
Input Mode for the Data Grid
Manual input - One by one
Copy and paste
Manual Input: Left-click to increment the value of any cell in the data grid and right-click to decrement the value.
Copy and paste: Copy a table of values from EXCEL/ Word. Select cells to make a table of the same size in the data grid then right-click and choose "Paste".
Rubrics for students perception of abilities attained:
1 or F: Student perceives his abilities as worth less than 60% marks
2 or D: Student perceives his abilities as worth 60% to 69% marks
3 or C: Student perceives his abilities as worth 70% to 79% marks
4 or B: Student perceives his abilities as worth 80% to 89% marks
5 or A: Student perceives his abilities as worth 90% to 100% marks
Data Error: None
Students perception of how well they have attained the Course Learning Outcome
Number of students with various perceptions about their abilities concerning each CLO
Weighted average of all CLOs
3.86
Deflate
Cancel
OK

Fig. 28: Window for entering data from student survey

1. ***Manual Input Mode:*** When the Manual Input Mode has been selected using the controls at the bottom of the table, data can be entered manually by using left mouse click as well as right mouse click. Left mouse click will increment the cell value by 1 while right mouse click will decrement the cell value by 1.
2. ***Copy and Paste Mode:*** If the student data is already available in a spreadsheet or word processor, the set of values can be copied from the source. Next, the user ensures that the Copy and Paste Mode has been selected from the controls located at the bottom of the table. After selecting corresponding cells in the table, the instructor right mouse clicks and a small menu appears with two options: Copy and Paste. The data can be pasted in the appropriate column of the table by choosing "Paste" from this menu.

6.2.2 Bar Chart

On bar chart, the numbers from 5 to 1 are represented by letters "A" to "F" such that 5 corresponds to "A", 4 to "B", 3 to "C", 2 to "D" and 1 corresponds to "F". Hence, the bar chart gives student perception of CLO attainment for individual CLOs as well as collectively for all

CLOs at a glance. Desired CLO can be plotted by using the dropdown list located beneath the bar chart.

6.2.3 Summary of Student Responses

The analysis table at the bottom right of the Figure gives a CLO wise summary of student responses. In this table, the percentages in the columns are summed up to determine what percentage of students perceive that the CLOs have been attained equal to or greater than the satisfaction criterion. The SO satisfaction is also calculated and displayed as shown in the bottom part of Fig. 28.

7 SATISFACTION OF OUTCOMES

Two of the indicators of student learning are CLO satisfaction and SO satisfaction. CLOSO generates CLO and SO satisfaction data automatically once the instructor has entered student marks for all assessments. This data can be viewed by clicking CLO Satisfaction and SO Satisfaction from the left panel. There are two sets of satisfaction data as explained in the following.

7.1 CLO Satisfaction

When the user clicks "CLO Satisfaction", a window shown in Fig. 29 appears. This window displays the summary of CLO satisfaction based on data from all assessments. It also shows the marks that were allocated to a particular CLO in each assessment. The output is displayed in the form of a table and the table is explained below:

- The table header shows the satisfaction criterion set in common syllabus file
- Each row of the table displays the data for an assessment
- The first column of the table displays the names of all assessments
- For each CLO, there are two columns labeled "M" and "P". Column labeled M lists the marks allocated to the CLO. Column labeled P lists the percentage of students satisfying the criterion for the CLO

This output window helps the instructor see the total marks allocated to each CLO and how each CLO is being satisfied.

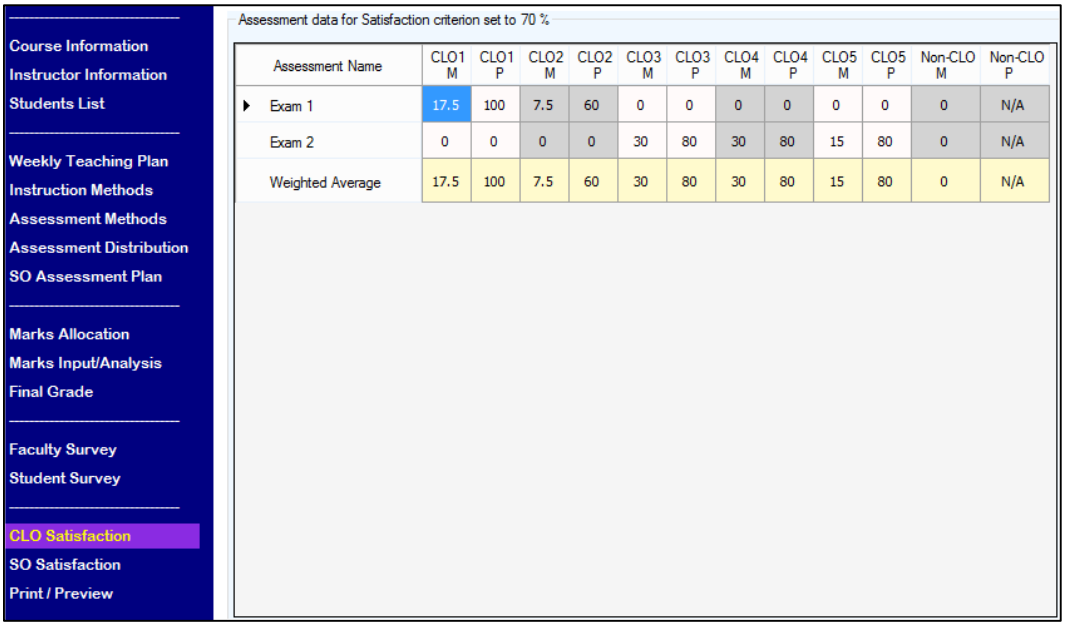

Fig. 29: CLO Satisfaction Data

7.2 SO Satisfaction

When the instructor clicks "SO Satisfaction", the SO Satisfaction window shown in Fig. 30 appears. It displays the final results after converting the CLO based data to SO based data.

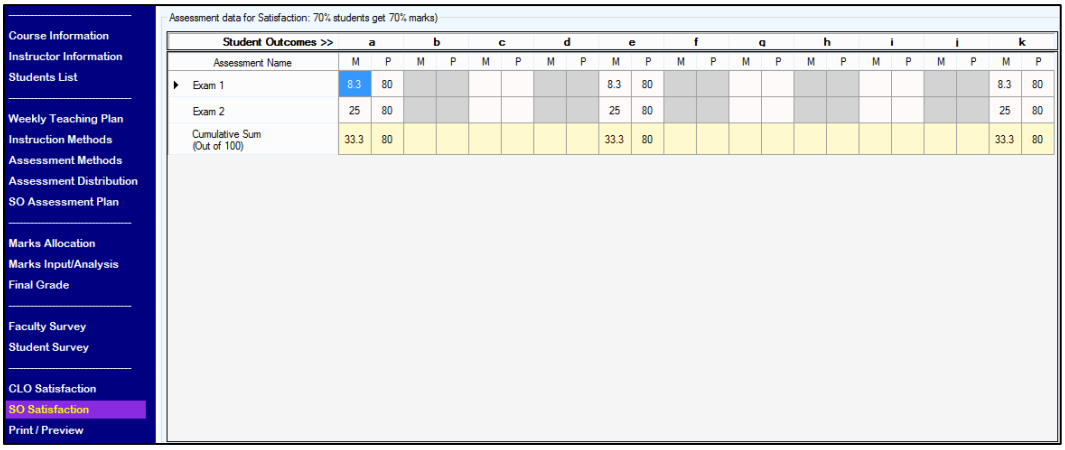
Course Information
Instructor Information
Students List
Weekly Teaching Plan
Instruction Methods
Assessment Methods
Assessment Distribution
SO Assessment Plan
Marks Allocation
Marks Input/Analysis
Final Grade
Faculty Survey
Student Survey
CLO Satisfaction
SO Satisfaction
Print / Preview
Assessment data for Satisfaction: 70% students get 70% marks)
Student Outcomes >> a b c d e f g h i j k
Assessment Name
Exam 1 8.3 80 8.3 80 8.3 80
Exam 2 25 80 25 80 25 80
Cumulative Sum (Out of 100) 33.3 80 33.3 80 33.3 80

Fig. 30: SO Satisfaction Data

The window shows, for all assessments, the marks associated with each SO under the header labeled "M" and the percentage of students attaining the program satisfaction criterion for each SO under the header labeled "P". The first column lists the names of the assessments. Two columns for each SO list the values of M and P. The last row displays a weighted average of the program satisfaction for each SO

obtained through all the assessments. The data displayed in this window is extremely useful as it is an indicator of student learning. Academic programs and departments use this data to prepare and implement continuous improvement plans and close the loop, i.e., observe if the improvement plans have indeed enhanced student learning.

8 PRINTING

Printing is another extremely useful and simple to use feature of CLOSO. Once all the information has been entered in the software, useful reports, assessment data and other information required for course folders can be printed. Details are described in the following.

8.1 Printing and Previewing Forms

When the user clicks Print/Preview a form shown in Fig. 31 appears. The group labeled Course File Forms can be used to print various forms for which the data was entered as explained in Chapters 3 to 6. User can choose a specific form that s/he wishes to print by checking the appropriate box. Or, by checking "Select all" all the forms can be printed or previewed.

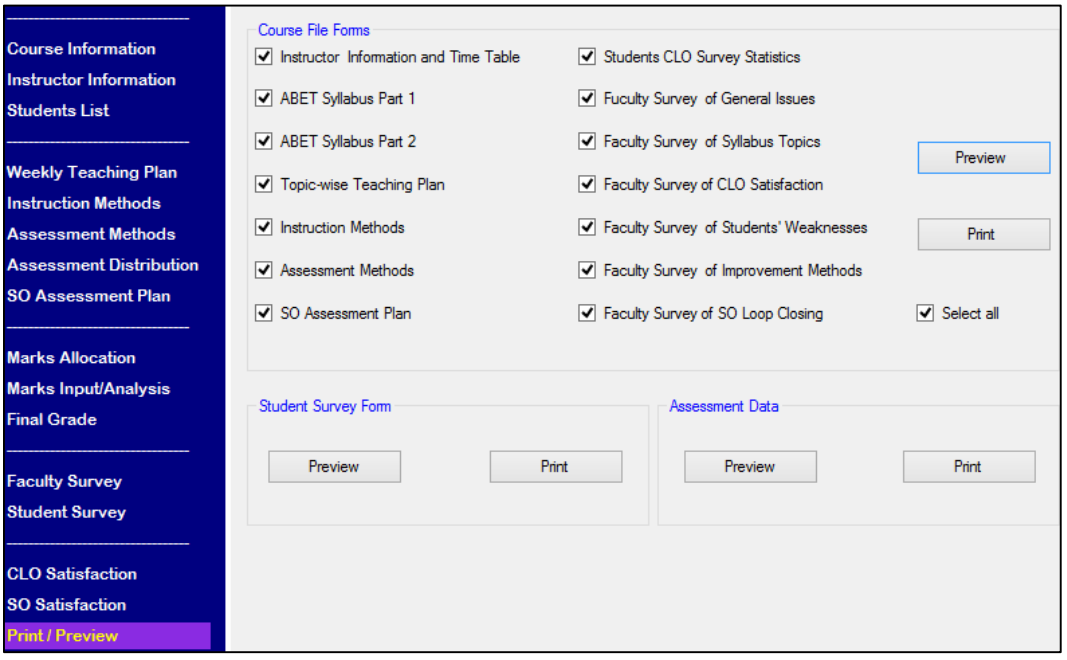

Fig. 31: Print Controls

By clicking the "Preview" button, the user can preview the forms before printing them. In order to print all or some of the forms, the user can click the "Print" button and it displays a dialog box shown in Fig. 32 warning the user that several pages will be sent to the printer. When the

user clicks yes, the print dialog box shown in Fig. 33 appears that can be used for printing.

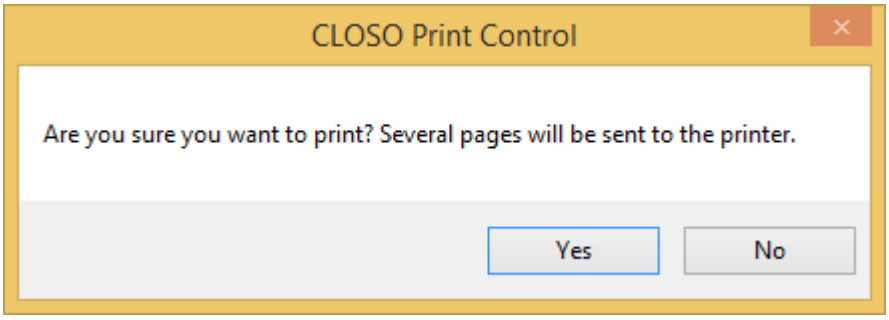

Fig. 32: Dialog box that appears when the user clicks the Print button

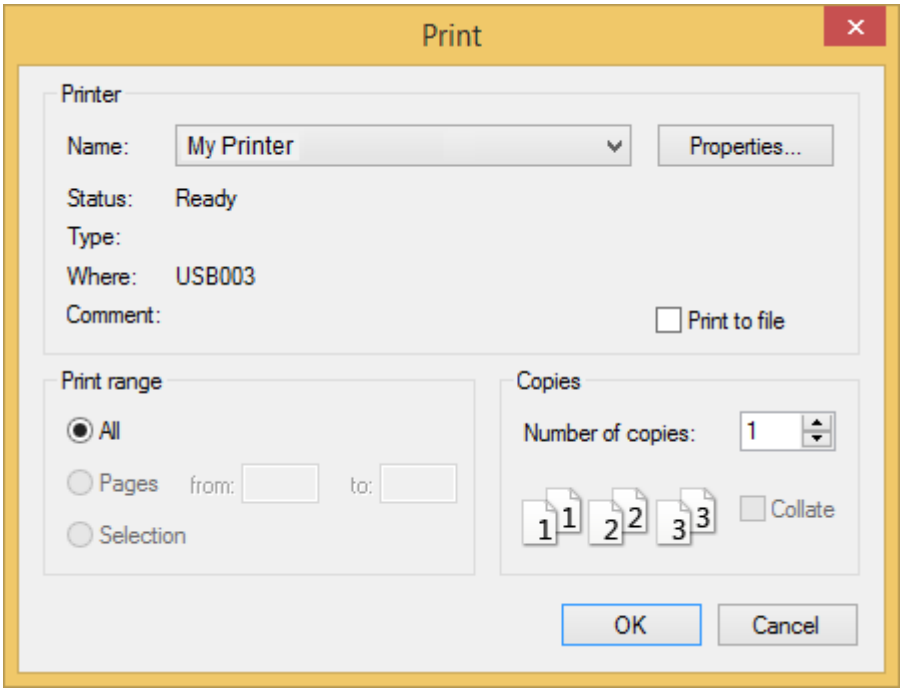

Fig. 33: Print dialog box

8.2 Printing and Previewing Assessment Data

Using the controls located on bottom right of the print window, all the assessment data can be printed. CLOSO prints the following information when the instructor clicks on the "print" button or shows a preview when the instructor clicks the "preview" button:

1. A cover page for "Assessment Data & Analysis" and "Assessment Samples"
2. For each assessment, a page giving details of CLO wise marks allocation

3. CLO wise raw marks for all the students for each assessment
4. Final grade sheet giving raw marks of each student, curved up marks and final grade
5. CLO satisfaction data
6. SO satisfaction data
7. Cover page for each assessment with instructions on attaching solution to the assessment and three samples of student work

A note of caution: After curving up student marks, if the instructor modifies marks of any student using the Raw Marks Input Mode (Section 5.25.2.1), these marks will appear in the printout of assessments as if these have been added to the curved up marks. This is natural because once the marks have been curved up, the software assumes that these are the actual marks of students and hence prints the curved up marks as the marks obtained by the students.

8.3 Printing Student Survey Form

In many cases, the student perception of attainment of CLOs is to be collected manually using a form. CLOSO prints a ready to use form for collecting student survey. The form contains all the necessary information and fields required for collecting the data and can be printed using the controls on the bottom left side of the print window. A sample printed form is shown in Fig. 34.

Instructor: Jeremy F. Brown

EE345- Electrochemical Energy Conversion; Class Section 1

Semester:Fall; Acdemic Year: 2013-14

Indirect Assessment of CLOs

(Student Survey)

Score Scale

1	2	3	4	5
Less than 60%	60% to 69%	70% to 79%	80% to 89%	90% to 100%

Respond to each of the following statements by giving a "Score" (1,2,3,4 or 5) using the scale given above. Your answer will not affect your actual grade in any way. The data will be used to improve the teaching in the future. If you think that your abilities in the CLO are worth an A grade give a score of 5, if you think that your abilities in the CLO are worth a B grade give a score of 4, if you think that your abilities in the CLO are worth a C grade give a score of 3, if you think that your abilities in the CLO are worth a D grade give a score of 2, if you think you learned almost nothing then give a score of 1:

	Course Learning Outcome (CLO)	Score
1	an ability to analyze/design electromagnetic circuits/devices. [a,e,k]	
2	an understanding of the concepts and principles of electromagnetic energy conversion. [a,k]	
3	an understanding of the concept of time-varying transformations in the analysis of time-varying systems. [a,e,k]	
4	an ability to analyze dc machines. [a,e,k]	
5	an understanding of converters for dc drives. [a,c,k]	
6	an ability to analyze brushless dc machines. [a,e,k]	
7	an ability to analyze induction machines. [a,e]	

Following is optional: If your estimation of learning outcome is different from your actual grade, this information will be used to find a way to minimize such anomalies.

Student's Name (Optional):	Signature (Optional):

Fig. 34: A sample of student survey form printed using CLOSO

9 Other Options

9.1 Syllabus View/Modify

Once this option is selected, a window shown in Fig. 35 appears. In this window, the instructor can modify contents of a course and save it in a file. The saved file can be sent to the administrator of your program for updating the main syllabus file. It should be noted that any changes made to a course using this window will not be effective until the administrator updates the main syllabus file using the admin tool.

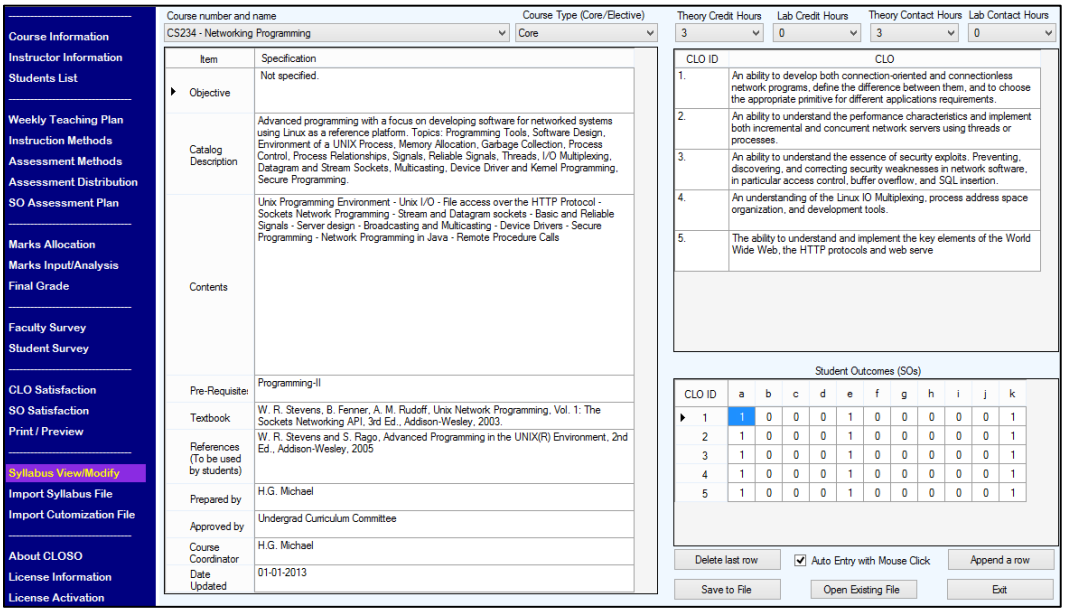
Course Information
Instructor Information
Students List
Weekly Teaching Plan
Instruction Methods
Assessment Methods
Assessment Distribution
SO Assessment Plan
Marks Allocation
Marks Input/Analysis
Final Grade
Faculty Survey
Student Survey
CLO Satisfaction
SO Satisfaction
Print / Preview
Syllabus View/Modify
Import Syllabus File
Import Cutomization File
About CLOSO
License Information
License Activation
Course number and name
CS234 - Networking Programming
Course Type (Core/Elective)
Core
Theory Credit Hours
Lab Credit Hours
Theory Contact Hours
Lab Contact Hours
Item
Specification
Objective
Not specified.
Catalog Description
Advanced programming with a focus on developing software for networked systems using Linux as a reference platform. Topics: Programming Tools, Software Design, Environment of a UNIX Process, Memory Allocation, Garbage Collection, Process Control, Process Relationships, Signals, Reliable Signals, Threads, I/O Multiplexing, Datagram and Stream Sockets, Multicasting, Device Driver and Kernel Programming, Secure Programming.
Contents
Unix Programming Environment - Unix I/O - File access over the HTTP Protocol - Sockets Network Programming - Stream and Datagram sockets - Basic and Reliable Signals - Server design - Broadcasting and Multicasting - Device Drivers - Secure Programming - Network Programming in Java - Remote Procedure Calls
Pre-Requisites
Programming-II
Textbook
W. R. Stevens, B. Fenner, A. M. Rudoff, Unix Network Programming, Vol. 1: The Sockets Networking API, 3rd Ed., Addison-Wesley, 2003.
References (To be used by students)
W. R. Stevens and S. Rago, Advanced Programming in the UNIX(R) Environment, 2nd Ed., Addison-Wesley, 2005
Prepared by
H.G. Michael
Approved by
Undergrad Curriculum Committee
Course Coordinator
H.G. Michael
Date Updated
01-01-2013
CLO ID
CLO
1. An ability to develop both connection-oriented and connectionless network programs, define the difference between them, and to choose the appropriate primitive for different applications requirements.
2. An ability to understand the performance characteristics and implement both incremental and concurrent network servers using threads or processes.
3. An ability to understand the essence of security exploits. Preventing, discovering, and correcting security weaknesses in network software, in particular access control, buffer overflow, and SQL insertion.
4. An understanding of the Linux IO Multiplexing, process address space organization, and development tools.
5. The ability to understand and implement the key elements of the World Wide Web, the HTTP protocols and web serve
Student Outcomes (SOs)
CLO ID a b c d e f g h i j k
1 1 0 0 0 1 0 0 0 0 0 1
2 1 0 0 0 1 0 0 0 0 0 1
3 1 0 0 0 1 0 0 0 0 0 1
4 1 0 0 0 1 0 0 0 0 0 1
5 1 0 0 0 1 0 0 0 0 0 1
Delete last row
Auto Entry with Mouse Click
Append a row
Save to File
Open Existing File
Exit

Fig. 35: Window for modifying courses

9.2 Import Syllabus File

This option allows the user to import syllabus file from any location in the hard drive of the user. This option is also available on the main CLOSO window.

9.3 Import Customization File

This option allows the user to import customization file from any location in the hard drive of the user. This option is also available on the main CLOSO window.

9.4 About CLOSO, License Information and License Activation

Clicking "About CLOSO" displays the copyright information and a disclaimer.

The next item is "License Information". When clicked, it shows licensee's name, license type, license ID, date of issue and date of expiry.

The third item on this menu is "License Activation". It lets the user install the license so that the department, college and university name is displayed on the main window as well as on printouts taken from the software.

10 REFERENCES

ABET. (2013). Retrieved July 2013, from http://abet.org/

Felder, R. M., & Brent, R. (2004). Designing and Teaching Courses to Satisfy the ABET Engineering Criteria. *Journal of Engineering Education, 92*(1), 7-25.